PARAGON
ARCHITECTURE

PROJECT MANUAL

BARRY-LAWRENCE REGIONAL LIBRARY

MONETT LIBRARY BRANCH

2200 PARK AVENUE
MONETT, MO 65708

Project # 19-556

Bidding Documents | June 11th, 2021

PROJECT MANUAL

PROJECT:

Monett Library Branch
2200 Park Avenue
Monett, MO 65708

OWNER:

BarryLawrence Regional Library
213 6th Street
Monett, MO 65708

ARCHITECT OF RECORD: Paragon Architecture, LLC

637 W. College Street
Springfield, MO 65806
Phone: 417.885.0002

Project Contact: Alex Mosby

CIVIL ENGINEER OF RECORD: Toth & Associates

1550 East Republic Road
Springfield, MO 65804
Phone: 417-888-0645

Project Contact: David Garrett

STRUCTURAL ENGINEER OF RECORD: J&M Engineering

3045 South Kansas Expressway
Springfield, MO 65807
Phone: 417-708-9315

Project Contact: Charles Taylor

MECHANICAL/ELECTRICAL ENGINEER OF RECORD: Interpres Building Solutions

1201 South Campbell Avenue
Springfield, MO 65807
Phone: 417-631-4895

Project Contact: Andrew Wilson

CONSTRUCTION MANAGER AT-RISK: RE Smith Construction Company

1036 West 2nd Street
Joplin, MO 64801
Phone: 417-623-4545

Project Contact: Clint Walton

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ARCHITECTURAL SPECIFICATION DISCLAIMER

PROJECT: Monett Library Branch
OWNER: Barry-Lawrence Regional Library
LOCATION: 2200 Park Avenue
Monett, MO 65708

ARCHITECT: Paragon Architecture, LLC
637 West College Street, Springfield, MO 65806

The Specifications to be authenticated by Paragon Architecture and the undersigned seal is limited to the specification sections listed below. Paragon Architecture hereby disclaims any responsibility for all other specification sections relating to or intended to be used for any part of this project other than those prepared by Paragon Architecture, LLC.

04 20 01	MASONRY VENEER
05 52 13	PIPE AND TUBE RAILINGS
06 10 10	NON-STRUCTURAL ROUGH CARPENTRY
06 41 00	ARCHITECTURAL WOOD CASEWORK
06 83 16	FIBERGLASS REINFORCED PANELING
07 11 13	BITUMINOUS DAMPROOFING
07 13 00	SHEET WATERPROOFING
07 19 00	WATER REPELLENTS
07 21 00	THERMAL INSULATION
07 25 00	WEATHER BARRIERS
07 41 13	METAL ROOF PANELS
07 42 13	METAL WALL PANELS
07 62 00	SHEET METAL FLASHING AND TRIM
07 92 00	JOINT SEALANTS
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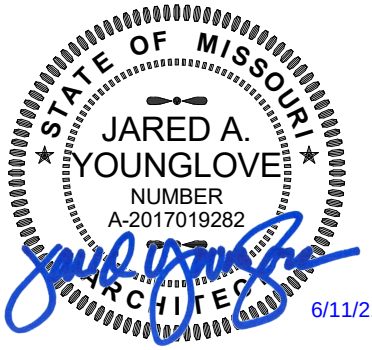
08 11 13	HOLLOW METAL DOORS AND FRAMES
08 14 16	FLUSH WOOD DOORS
08 43 13	ALUMINUM FRAMED STOREFRONTS
08 71 00	DOOR HARDWARE
08 80 00	GLAZING
09 05 61	COMMON WORK RESULTS FOR FLOORING PREPARATION
09 21 16	GYPSUM BOARD ASSEMBLIES
09 30 00	TILING
09 51 00	ACOUSTICAL CEILINGS
09 65 00	RESILIENT FLOORING

09 68 13	TILE CARPETING
09 84 30	SOUND ABSORBING WALL AND CEILING UNITS
09 91 13	EXTERIOR PAINTING
09 91 23	INTERIOR PAINTING
10 11 00	VISUAL DISPLAY UNITS
10 14 00	SIGNAGE
10 21 13.19	PLASTIC TOILET COMPARTMENTS
10 26 00	WALL AND DOOR PROTECTION
10 28 00	TOILET, BATH, AND LAUNDRY ACCESSORIES
10 44 00	FIRE PROTECTION SPECIALTIES
10 56 17	WALL MOUNTED STANDARDS AND SHELVING
10 75 00	FLAGPOLES
11 51 16	BOOK DEPOSITORY
12 24 00	WINDOW SHADES
12 36 00	COUNTERTOPS
31 31 16	TERMITE CONTROL
33 41 01	SUBDRAINAGE



6/11/21

JARED A. YOUNGLOVE, ARCHITECT
MO #: A-2017019282

SPECIFICATION DISCLAIMER

PROJECT: BLRL Monett Branch

OWNER: Barry-Lawrence Regional Library

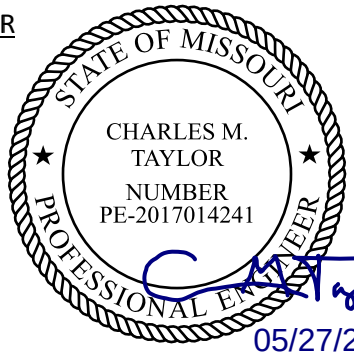
LOCATION: Monett, MO

CIVIL ENGINEER: TOTH AND ASSOCIATES, INC
1550 E. Republic Road
SPRINGFIELD, MO 65804
P: (417) 888-0645
MISSOURI COA #2004004242

The Specifications to be authenticated Toth and Associates and the undersigned seal is limited to the specification sections listed below. Toth and Associates herby disclaims any responsibility for all other specification sections relating to or intended to be used for any part of this project other than those prepared by Toth and Associates, Inc.

02 41 13 SITE DEMOLITION
31 10 00 SITE CLEARING
31 23 00 EXCAVATION AND FILL
31 25 00 EROSION AND SEDIMENTATION CONTROLS
32 11 00 CAST-IN-PLACE CONCRETE FOR SITEWORK
32 12 16 ASPHALT PAVING
32 17 23 PAVEMENT MARKINGS
32 92 00 TURF AND GRASSES
33 10 00 WATER UTILITY DISTRIBUTION
33 31 00 SEWER UTILITY SEWERAGE PIPING
33 41 00 STORM UTILITY DRAINAGE PIPING
33 49 00 STORM UTILITY DRAINAGE STRUCTURES

STRUCTURAL SPECIFICATION DISCLAIMER



05/27/2021

PROJECT:	Monett Library Branch
OWNER:	Barry-Lawrence Regional Library
LOCATION:	2200 Park Avenue Monett, MO 65708
ENGINEER:	J&M ENGINEERING, LLC 3045 S. KANSAS EXPY SPRINGFIELD, MO 65807 P: 417-708-9315

The Specifications to be authenticated by J&M ENGINEERING, LLC and the undersigned seal is limited to the specification sections listed below. J&M hereby disclaims any responsibility for all other specification sections relating to or intended to be used for any part of this project other than those prepared by Paragon Architecture, LLC.

00-01-0	SPECIFICATION DISCLAIMER
03-30-00	CAST-IN-PLACE CONCRETE
04-22-00	UNIT MASONRY
05-12-00	STRUCTURAL STEEL FRAMING
05-31-00	STEEL DECKING
05-44-00	COLD-FORMED METAL TRUSSES
05-50-00	METAL FABRICATIONS

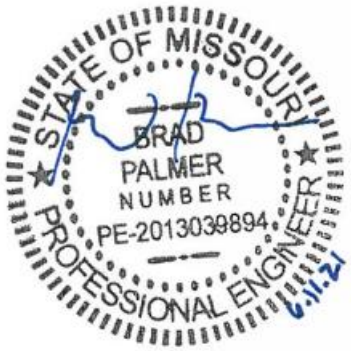
REGISTRANTS

The personal seal of the registered Architect of Record or each shown Engineer shall be the legal equivalent of his signature whenever and wherever used, and the owner of the seal shall authenticate this sheet and the specification sections pertaining to this sheet. Responsibility shall be disclaimed for all other plans, specifications, estimates, reports or other documents or instruments relating to or intended to be used for any part or parts of this project.

Those sections each discipline is responsible for shall be as listed alongside seal of same.

MEP ENGINEER OF RECORD

SEAL



MO # PE-2013039894

Interpres Building Solutions
1201 South Campbell Ave.
Springfield, Missouri 65807
Missouri State Certificate of Authority # 000607

All of Divisions 22, 23, 26 & 28

Brad Palmer, PE

SECTION 00 11 13 – ADVERTISEMENT FOR BIDS

YOU ARE HEREBY INVITED TO PROVIDE PROPOSALS FOR THE FOLLOWING PROJECT:

Barry-Lawrence Regional Library:

MONETT BRANCH LIBRARY

For The Owner:
Barry-Lawrence Regional Library
Monett, MO 65708

To The Construction Manager:
R.E. Smith Construction Co.
1036 W. 2nd St.
Joplin, MO 64801
(417) 623-4545

THE PROJECT:

The Project Site is located at 2200 Park Street, Monett, MO 65708, at the corner of Park Street and Old Airport Road in the city of Monett, the state of MO and the county of Lawrence.

The CM is soliciting bids for this project through multiple bid packages from subcontractors. Refer to Scopes of Work in Section 00 20 00.

The Project consists of Construction of a new 22,000 sqft facility for the Barry-Lawrence Regional Library. It includes, but not limited to; Sitework, Site Utilities, Site Concrete and Asphalt, Concrete Building Foundation Systems, Masonry, Misc. and Structural Steel, Rough Carpentry, Millwork, Standing Seam Roofing and Metal Wall Panels, Hollow Metal and Wood Doors, Aluminum Framed Entrances and Windows, Finish Hardware, Metal Stud Framing, Gypsum Board, Acoustical Ceilings, Tile, Resilient Flooring, Painting, Fire Sprinkler, Plumbing, HVAC, Electrical and Special Systems.

BID PERIOD:

Bid Packages <June 16, 2021 through July 7, 2021>

PRE-BID CONFERENCE:

A pre-bid conference will be held on **June 23, 2021, 2:00 pm,** at the Barry-Lawrence Branch library in Pierce City (101 N. Walnut St. Pierce City, MO 65723) in the conference room. If you are unable to join in person, the CM has set-up a Zoom Meeting so that all entities can join regardless of location. The zoom meeting link is provided here:
https://us02web.zoom.us/j/84478886700
The Pre-Bid is not mandatory but attendance is strongly recommended and may be used as a qualification at post-bid interviews.

BIDDING:

Bid Package proposals for the **Barry-Lawrence Regional Library, Monett Branch Library,** shall be received at:

Barry-Lawrence Pierce City Library
101 N. Walnut St.,
Pierce City, MO 65723
Attn: Clint Walton
R.E. Smith Construction Company

Bidding:
Barry-Lawrence Regional Library:
Monett Branch Library

no later than **2:00 p.m.** Central Time, **July 7, 2021.** See Section 00 21 13 Instructions to Bidders for more information. Bids will be opened and read publicly**.** The Bid Form, all bid submittal requirements must all be received as described herein and in Section 00 19 00 Submission for Bids and Instruction to Bidders to be considered a Complete Bid Proposal. The bid opening will also be offered for attendance on the zoom meeting platform and can be attended by following the link: https://us02web.zoom.us/j/89519250934 Please note that YOU MUST BE IN the meeting room by 2:00 pm as once bids start being read no more attendees will be allowed.

The bidders understand that the CM and the Owner reserves the right to award the contract to the **lowest and best responsible bidder,** and to reject any or all bids and/ or to waive any and all technicalities or informalities in the bidding. (Refer to Division 00 documents for a clarification on evaluating lowest responsible bidder). No bids may be withdrawn for a period of **forty five (45)** days subsequent to the specified time for receipt of bids.

BID DOCUMENTS, DRAWINGS AND SPECIFICATIONS:
Bid Documents, Drawings and Specifications and other related contract information have been provided to the following locations:

**Tri-State Area Contractors Association, Joplin, MO (417-627-9392)
**Engineering Reprographics, Springfield, MO (417-869-2222)
**R.E. Smith Construction; www.resmithconst.com (417-623-4545)

**Hard Copies of plans and specifications and other related contract information may be obtained at the bidders own expense through any of the above ** marked locations, or as the bidder so chooses.

Any questions related to Bid Document procurement or clarifications are to be directed to the CM:

R.E. Smith Construction Company
Attn: Clint Walton
estimating@resmithconst.com
1036 W. 2nd Street
Joplin, MO 64801
(417) 623 4545

RETAINAGE:
The Owner shall retain an amount of 5% of the cost of construction throughout the Construction Period. The retainage will not be reduced during the project and will only be released as a part of the CM's final pay application.

PREVAILING WAGE:
This project DOES comply with the current MO DOL Prevailing Wage Order for Lawrence County, MO. See Section 00 51 00 Prevailing Wage Order.

TAX EXEMPT STATUS
BIDS SHALL NOT include Sales tax on material.

PERFORMANCE AND PAYMENT BOND:
A Performance and Payment Bond may be required of the successful bidders in the amount of 100% of the contract amount. The bond amount will need to be listed on the bid form in the space provided. It shall not be included in the Bid Package total.

WITHDRAWAL OF BIDS:
Bids may not be withdrawn for a period of (45) forty five days.

DAMAGES:
Real Damages/Delay Damages in the amount of $500.00 per calendar day and Liquidated Damages in the amount of $1,000.00 per calendar day may be assessed every day that work is not completed per the Construction Schedule and after the scheduled final completion date is not achieved.

END OF SECTION 00 11 13

SECTION 00 19 00 - SUBMISSION OF BIDS

ALL BIDS ARE DUE NO LATER THAN 2:00 p.m. CT on July 7, 2021 as follows:

1. **Hand Delivered and Mailed Bids** are to be delivered:
   a. In a Sealed envelope bearing the following:

Barry-Lawrence Pierce City Library
101 N. Walnut St.,
Pierce City, MO 65723
Attn: Clint Walton
R.E. Smith Construction Company

Bidding:
Barry-Lawrence Regional Library:
Monett Branch Library

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   b. Include the Bid Form Section 00 41 00 filled out in its entirety.

2. No other bidding types will be accepted.

End of Section 00 19 00

SECTION 00 20 00 - SCOPES OF WORK (BID PACKAGES)

SCOPES OF WORK (BID PACKAGES)

Common Requirements	Provisions (Applicable to **ALL** Bid Packages)
Bid Package 03	Concrete
Bid Package 04	Masonry
Bid Package 05	Structural Steel
Bid Package 06	Millwork
Bid Package 07	Metal Wall & Roof Panels
Bid Package 07A	Fiber Cement Siding
Bid Package 08	Storefronts/Glazing
Bid Package 08A	General Trades
Bid Package 09	Metal Studs/Gyp Board/Ceilings/Insulation
Bid Package 09A	Flooring
Bid Package 09B	Painting
Bid Package 21	Fire Sprinkler
Bid Package 22	Plumbing
Bid Package 23	HVAC
Bid Package 26	Electrical
Bid Package 31	Site Work/Site Demolition
Bid Package 32	Asphalt Paving

Common Requirements

Provisions (Applicable to *ALL* Bid Packages)

A. The Common Requirements Section is to be included by ALL Bid packages and include, but are not limited to the following:

1. You are bidding on a project that is under a Construction Management at Risk contract. The Construction Manager at Risk is RE Smith Construction Co. If your company enters into an agreement with RE Smith Construction all requirements of this section will be included in your agreement. RE Smith Construction **will not** enter into any agreement with Subcontractors or Suppliers who have in the past displayed unethical behavior or business practices or who supports unethical or illegal behaviors or business practices. An example of unethical behavior is if a company provided a deduct cost on an alternate on the bid day bid form and then in the future is asked for the deduct and the company provides less than the bid day deduct amount.
2. Your bid shall include all items per plans and specifications for a complete system unless noted otherwise. If you would like to provide a product that is not listed in the plans or specifications as an equal, you must do so during the bidding period and get approval to use said product from the Construction Manager (furthermore known as CM) via addendum.
3. The Notice to Proceed is anticipated to be issued the week of July 19, 2021. If the Notice to proceed is delayed the project schedule will be amended accordingly with no detriment to Owner.
4. Substantial Completion is scheduled for August 2021 and Final Completion 30 days later.
5. The CM's Project Manager, as assigned, shall be the Final Decision Maker on all matters concerning the CM's documents.
6. Testing and Inspections is by the Owner.
    a. All Subcontractors are to notify the CM at least 24 hours in advance for ALL tests per plans and specs that require third party testing
    b. If it is necessary, by no fault of the Owner or CM, to re-test/re-inspect due to a Subcontractors' inability to perform as required or initial test is non-conforming, the cost of the re-test/re-inspection will bear solely on the Subcontractor.
7. Excessive use of any on-site utilities will not be tolerated and the CM reserves the right to charge Subcontractor's or terminate the use of the utility (ies) for said Subcontractors. Excessive use includes but is not limited to faulty water hoses, electrical devices that remain on while not in use, etc.
    a. The Electrical Bid Package, Bid Package 26 will Provide and maintain interior temporary lighting as required by provisions of OSHA CFR 1926 Subpart D

standard number 1926.53 (Table D-3). Subcontractors working outside the interior building envelope will be required to provide their own temporary lighting as required for their bid package to be completed with-in the project schedule.

8. All Bid Packages are to include all work necessary for mock-ups as listed in the project documents. Include all necessary costs for procuring material for this work, including additional delivery, shipping and handling fees, ahead of that work/material needed for permanent installation. Mock-ups will need to be completed prior to the actual materials needing permanently placed in/on the building.
9. The CM will provide temporary toilets and dumpsters as required for construction.
10. It is every Subcontractors responsibility to clean-up all work areas of their own debris/materials as was created by their work. Final Clean-Up is by Bid Package 08A Subcontractor.
    a. Trash/debris is to be collected by the Subcontractor and deposited into jobsite dumpsters as required daily or as directed by the CM. This includes sweeping each work area. Excess or extra materials that have not been installed shall be neatly organized and arranged in areas that do not disrupt the flow of work or the work of others. As necessary include the cost of on or offsite storage locations for your materials and equipment and include requirements for moving excess or extra material out of the building/area when not needed and back-into the building/area when needed.
    b. All conveyance, moving and transporting of Construction debris/excess materials or materials not yet in place will be the responsibility of the Subcontractor.
11. All Layout and staking as required to complete this bid package in its entirety. CM will provide control points and benchmarks only.
12. Shoring, blocking, bracing etc. necessary to complete any work with-in their respective Bid package is the sole responsibility of that subcontractor.
13. All excavations are to be per Safety Requirements, OSHA and R.E. Smith Construction Safety Policies.
14. Coordinate with the CM and other trades as necessary to ensure the overall project schedule is met.
    a. Includes but not limited to
        i. Progress Meetings
        ii. Work in place
        iii. Pre-Installation Meetings
        iv. Submittals
        v. RFI’s
        vi. ASI’s and SI’s
        vii. PR’s and CO’s.

15. Coordination and requirements in purchasing and maintaining of any and all permits, inspections, verification, utility locates, tap fees as needed and requirements of and by any and all State, Federal and Local Authorities Having Jurisdiction.
16. This Job Site is NON-SMOKING/NON-VAPING and any person(s) violating this requirement shall be subject to a $100 fine/occurrence. THERE WILL BE NO WARNINGS for this offense.
17. This job may utilize Procore/Submittal Exchange for all Construction Document Collaboration; Submittals, RFI's, PR's, ASI's/SI's, Meeting Minutes, Schedules, Pay Apps, Closeout Documents, other items deemed necessary by CM.
    a. All information will be available to all subcontractors on the web-based platform and it is the Subcontractors responsibility to respond with-in 48 hours to the CM of any costs associated to newly uploaded ASI's, SI's, PR's etc. After 48 hours a no cost change will be entered for the Subcontractor if no response is received or the CM may utilize RS Means or other work cost based program to provide the credit or add on the Subs behalf. Any additional costs associated with the work of the Bid Package will bear solely on the Subcontractor.
18. Plans and Specifications are available for viewing/download at the locations described in the Project Manual.
    a. Plans and Specifications will be available for view and download on the project website after bidding for awarded subcontractors.
    b. Any and all costs that arise from the Subcontractor procuring Plans and/or Specifications fall directly on the Subcontractor.
19. Submittals are considered here-in to be time sensitive where-in all submittals need to be collected by the Subcontractor per specific sections included in their relative scopes of work and uploaded to Procore/Submittal Exchange, Submittal Tab in the correlating section no later than by the dates set in the Submittal Schedule but no later than 21 days after the NTP date. It is the responsibility of the Subcontractor to submit their submittals and track approvals and order and have on hand products well in advance of other work that requires the subject submittal to be installed. Time required by the CM to work overtime or outside of normal project work times (8am-5pm, Monday – Friday excluding Holidays) will constitute a backcharge to the Subcontractor in the amount of $275.00 per submittal.
20. Include all Safety Requirements including but not limited to, OSHA, R.E. Smith Construction Company other Authorities having Jurisdiction and are to be adhered to at all times. Fall Protection is the duty of each individual Subcontractor until such time as temporary or permanent guardrails are in place.
    a. Safety is of the utmost concern to R.E. Smith Construction and unsafe acts will not be tolerated.
        i. Unsafe conditions shall be reported to the Site Superintendent immediately

ii. Unsafe Practices shall be reported to the Site Superintendent immediately
iii. Hard Hats and Safety Glasses (ANSI Z87.1) are required at all times. No shorts, tennis shoes, cut-off t-shirts or other inappropriate attire will be permitted.
iv. High-Reflectivity jacket, vest or shirt must be worn at all times on site.

21. All Subcontractors, Subcontractors employees, Subcontractors Third-Tier Subcontractors, Visitors etc. before coming on site must have on adequate PPE (Hard Hat and Safety Glasses, High-Reflectivity vest/shirt minimum) and will be required to Sign-In and Sign-out at the Superintendent's Job Site Trailer.
22. This job requires all employees of all Subcontractor Companies performing work to have at minimum a 10 hour OSHA construction hazard training class. The class is to be approved by OSHA and the employee must maintain on their person or in close proximity proof of such training.
    a. Employees will be required to show at start of work, proof of the training and this information will be recorded on site. The Subcontractor must also provide this information to R.E. Smith Construction's Project Manager prior to employees doing work.
23. Include all requirements of the Subcontract between R.E. Smith Construction Company and the Subcontractor as included in Attachment. No changes to the contract will be allowed. After execution of the contract or after the Notice to Proceed has been sent to the Subcontractor, the CM may at any time direct the Subcontractor to do extra work and the CM has sole discretion as to whether extra work is done on an invoice or as a Change Order. Email approvals from the CM's Project Manager to the Subcontractor shall be approved and work shall proceed the same as if there was a signed copy of the Change.
24. Any Safety related item installed by other Bid Packages that needs to be removed, moved, altered etc. to allow work of this Bid Package, is to be removed by this Bid Package and re-installed in the appropriate manner after this Bid Package work is complete in subject area.
25. No exclusions to a bid package will be allowed. If any exclusion is listed on a bid form, the bid will be identified as non-responsive.
26. It is the responsibility of the installing subcontractor to approve the substrate on which their product is being installed prior to installing. Painters will prime walls/ceilings 1 time and then point out defects that require fixing to the wall installer via the CM's superintendent before work will commence. The Painter will then re-prime the entire wall/ceiling area before commencing with next coats. All other Subcontractors are to verify that the substrate is approved prior to commencing with any work.
27. Hoisting, Conveying, Moving of all material, tools, equipment etc. is the duty of each Subcontractor for their own scope of work.

28. Where/When/If the word Contractor, General Contractor or similar is written in the plans and/or specifications this will mean to be by the Sub-Contractor of that Scope of Work/Bid Package. All work of this project is included in the Bid Packages except those items expressly written as by the CM or Owner and will fall to the relevant Bid Packages/Scopes of Work as can be reasonably inferred by similar work of the project.
29. Subcontractors and Suppliers are responsible for providing the most stringent in any case of any discrepancies found in the project documents so that the CM, if any instances are brought into question, can decide between the two instances.
30. Subcontractors may be required to include the cost of their performance and payment bond. Include this amount in the location indicated on the bid form in the amount of 100% of the contract sum. If proposal is accepted and Bonds are required they shall be on the standard form of the AIA Document A312 with such Sureties as may be approved by the CM.
31. Bids shall be made on the Bid Form included in the project manual.
    a. Bids shall be submitted as discussed in the project manual.
32. A Preliminary Construction Schedule from the CM will be provided as soon as possible. It is imperative that each Subcontractor reviews the schedule as failure to meet the schedule will result in the Subcontractor being held responsible for Liquidated and/or Real Damages as indicated in the project manual. This schedule will be revised at each progress meeting throughout the project and Subcontractors are to adhere to the dates as scheduled.
    a. Subcontractors shall provide their own schedule at maximum 7 days after a NTP is sent to them by the CM. They will have input on items of the project schedule as made by the CM, as the Schedule of Values will mirror the Project schedule, as well as progress meetings but the completion date is set and the CM will ultimately schedule as appropriate to meet this deadline.
33. On projects mandated by Prevailing Wage or the Davis Bacon Act: Certified/Signed payroll reports will be required of ALL WORKERS who perform work on this project and will be submitted in duplicate no later than with the current month's payment applications.
    a. If no work occurs for a certain week but the Subcontractor has worked previous weeks, A "NO-WORK" week payroll report will be sent. This can be used up to one month for no work.
34. Payment Applications:
    a. All Pay Apps will be completed utilizing PROCORE.
    b. Schedule of Values:
        i. A Schedule of Values is required to be submitted to the CM within 7 calendar days after the Notice to Proceed or contract receipt, whichever is sooner.

1. The SOV will be approved by the CM and at that time the Subcontractor shall enter their Breakdown and Values (SOV) into their SOV on Procore for FINAL CM approval.

c. Once approval is received from the CM, the Subcontractor is then able to bill, barring all other requirements of the contract have been met.
d. All Material and/or Lower-Tier Subcontractor Invoices for the current pay period must accompany each Pay Application.
e. Partial or Full Lien Releases/Waivers must accompany the Pay Application starting with Pay App #2 and must be on the Approved Subcontractor Supplier List. Lien Releases from payments received or from work completed being billed for must be provided by all suppliers or lower-tier subs as well as for the Subcontractor itself.
f. If stored material is being billed, the subcontractor will bill for only that amount of material and only the overhead cost required to procure and store the material with no mark-up and provide to the CM the following documentation:
    i. Invoices for ALL material being billed as stored in a legible fashion showing the value of all billed for stored material including an inventory list showing the material items, the value of each item and at the bottom of the list showing the value of the overhead cost.
    ii. Pictures of ALL material being billed as stored.
    iii. A Right of Entry listing the CM, the Architect and the Owner as allowable companies with individuals approved as deemed necessary by the entity are able to come on the premises where the stored material is being stored, inventory and take pictures as necessary and review the material as necessary to verify that the stored material being billed is indeed in place at the location.
    iv. Certificate of Insurance showing/stating that the value of the material being stored is covered + 50%, that the location where the material is being stored is insured for the above stated value.

35. Progress Meetings will be held bi-weekly or as needed and a representative from each Subcontractor whose work will be starting in the next two weeks is required to attend. After the initial meeting the Subcontractors representative will be required to attend all Progress Meetings until 1 month after the Subcontractors work is completed or Final Completion is met whichever is first. The CM may call for a Subcontractor to come ahead of or after the Subcontractors initial/last meeting date if deemed necessary. **The representative in attendance must be able to speak for and make decisions on behalf of the Subcontractor Company.**
36. The Subcontractor must be able to maintain sufficient manpower, tools, equipment etc. to meet the Construction Schedule including overtime, night, weekend, holiday work, etc.
37. Cold/Hot Weather Protection as required is to be included.

38. Time lost due to weather conditions must be made up by Subcontractors.
39. The Subcontractor, at all times, must have on site a Competent Person, Superintendent or Foreman whom which the CM can discuss day to day activities and who has the authority to make company level decisions concerning manpower, equipment and material for their Scope of Work.
40. Parking will only be allowed in designated areas as approved by the CM.
    a. Light Duty Trucks, Vans, SUV's and Cars will be only allowable vehicles
    b. Any unauthorized parking will result in a $100.00 fine multiplied per offense up to 3, where-in after the subject vehicle will be towed at the vehicle owner's expense.
41. A Designated area for consumption of food and beverages may be established by the CM for use by all subcontractors and their employees. Trash/debris generated during consumption, regardless of the location consumed at the project site, is to be deposited in dumpsters/trash receptacles by the Consuming Subcontractor and their employees prior to leaving this area. No radios will be allowed on site at any time.
42. Temporary lay-down area/Storage area will be located as directed by the CM. Space is limited and may be on a first come first served basis at the discretion of the CM. Any exterior containers, trailers or other storage devices are the sole responsibility of the Subcontractor.
43. Delivery of materials for the Subcontractor is to be done by the Subcontractor having sufficient forces on site to offload so at the time of delivery.
44. Subcontractors are required to do their own take-off for their scope of work and not rely on any quantities stated or shown on plans.
45. All spoils created by Subcontractor are to be disposed of Offsite at locations procured by the Subcontractor.
46. All Subcontractors are responsible for their own licenses that may be required by State, Local or Federal Jurisdictions' before any work on this project may commence. Any and all costs for license(s) will be paid by the subcontractor.
47. All Subcontractors are responsible for procurement and purchasing any and all licenses, permits, tap fees, special inspections, other fees with-in their Bid Package.
48. Storage of material inside of any building is prohibited unless approved by the CM.
49. If a Bid Package lists a Section Number and Description that indicates that the Entire Section is to be included complete.
50. The Bid Packages, as compiled, including specification sections and verbiage are to be bid as a complete system, including all components for the complete system. When work is associated with a specific bid package but the associated specification section is not listed in the bid package it is the same as if the section was listed.
51. The Owner and CM reserves the right to reject any and all bids.
52. The CM will only award agreements/contracts/PO's based on the lowest responsible qualified proposal, provided it is in the best interest of the Owner and/or CM.
    a. To determine the lowest responsible qualified proposal the CM will evaluate proposals based on at least the following considerations:

i. Total amount of proposal including Base Bid and Alternate Bids
ii. Completed Bid Form
iii. Bidders bonding rate and capacity
iv. Sufficiency of Bidders financial resources
v. Evaluation of Bidders labor rates and available manpower, personnel and other resources.
vi. Bidders ability to perform in accordance with the Contract Documents
vii. Bidders history of performance working under the CM
viii. Evaluation of Bidders Safety Record
ix. Bidders history of compliance with applicable laws, codes, rules, regulations
x. Past, Current or Pending litigation and the amounts and nature there-in

53. A Post bid interview may be required of Subcontractors at the discretion of the CM. Those Subcontractors that the Post-Bid Interview is deemed required of will be contacted with-in 48 hours after Bid opening with specifics on the meeting.
54. It is the responsibility of the Subcontractor to be aware of the project in its entirety including all other bid packages and the inclusions and exclusions there-in.
55. Any discrepancies, questions or RFI's of any sort in Bid Packages, Plans, Specifications etc., are to be asked in written form either e-mail or mail to the attention of the CM per the Project Documents at minimum 96 hours before the time that bids are due.
56. By providing and signing the Bid Form you hold RE Smith Construction and it's employees harmless and agree to all terms as set forth on the Bid Form and in the plans and specifications of which this document is a part.

Bid Package 03

Concrete

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Concrete** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B
Division 03 – Concrete

- Section – 030516 Underslab Vapor Barrier
- Section – 033000 Cast-In-Place Concrete

Division 05 – Metals

- Section – 051200 Structural Steel Framing
- Section – 055000 Metal Fabrications
    - As it applies to installation of anchor bolts, bollards and other steel items installed/embedded in concrete supplied by others.

Division 07 – Thermal & Moisture Protection

- Section – 072100 Thermal Insulation
    - As it applies to below grade insulation.
- Section - 079200 Joint Sealants
    - As it applies to caulking at control joints in SOG and sidewalks when/where detailed and/or specified.

Division 31 – Earthwork

- Section – 312300 Excavation and Fill
  As it applies to the scope of work in this bid package.
- Section – 313116 Termite Control

Division 32 – Exterior Improvements

- Section - 321100 Cast-in-Place Concrete for Sitework

Additional bid package requirements:

1. Hoisting of all materials.

2. Layout of all building concrete items embedded in concrete and architectural and structural control and expansion joints in concrete applications. CM will provide 2 control points and 1 benchmark only.
3. Cold and hot weather requirements, including hot water /ice in concrete mixes and protection of concrete items to maintain the project schedule.
4. All bracing as needed/required.
5. Providing/installing all required reinforcing, including supports such as chairs and weldable couplers.
6. Spoils removal will consist of transporting all spoils from this bid package to a location designated by the project superintendent. BP 31 subcontractor will utilize the spoils that are suitable for site grading and will haul off site all spoils that are unsuitable.
7. Include required concrete wash-out pit, maintenance and removal.
8. Include all required concrete pumping to complete this scope of work.
9. Joint filling of all saw joints in slabs.
10. Include the installation of all structural steel anchor bolts and all steel embedded items in concrete. BP 05 subcontractor will furnish the material.
11. Include all base rock under the slab and at wall backfill. Only base rock may be used as wall backfill.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 04

Masonry

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Masonry** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B

Division 04 - Masonry

- Section 04 20 01 Masonry Veneer
- Section 04 22 00 Concrete Unit Masonry
  - Include the furnish and install of masonry reinforcing per this section.

Division 05 – Metals

- Section 05 12 00 Structural Steel Framing
  - As it relates to install of steel items in masonry provided by others.
- Section 05 50 00 Metal Fabrications
  - As it relates to install of steel items in masonry provided by others.

Division 07 – Thermal & Moisture Protection

- Section 07 19 00 Water Repellents (as required at split face block and exposed CMU block)
- Section 07 21 00 Thermal Insulation
  As it relates to insulation requirements of masonry walls.
- Section 079200 Joint Sealants
  As it relates to filling joints in ALL masonry applications and where masonry work abuts other materials. Example: At Column Line E on elevation 3 on sheet A3.0 metal panel abuts masonry. Include the caulking between the masonry and metal panel. This is an example and is to be considered typical at all locations.
- Expansion Control
  As it relates to expansion control requirements in masonry applications.

Division 08 – Openings

- Section 08 11 13 Hollow Metal Doors & Frames

- As it relates to install of Hollow Metal Frames in Masonry walls.

Additional bid package requirements:

1. Hoisting of all materials.
2. Layout and install of all masonry walls, embeds in masonry and architectural and structural control and expansion joints in masonry applications. CM will provide 2 control points and 1 benchmark only.
3. Cold and hot weather requirements, including enclosures and protection of masonry to maintain the project schedule.
4. All bracing as needed/required.
5. Furnish and install grout below all embed plates installed in masonry as required.
6. Furnish and Install Precast Architectural Cap per Key Note 03.4500.02 on Elevations and Section/Detail sheets.
7. Furnish and Install all rigid insulation at ALL Wall types with the exception of Exterior Walls with Metal Wall Panels which is by BP 07.
8. Include hand and machine pumping of mortar and grout as required to complete this scope of work.
9. Includes installation of all Hollow Metal frames provided by others.
10. Include grouting of Hollow Metal frames as shown or as specified regardless of the frame location.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 05

Structural Steel

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Structural Steel** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B

Division 05 – Metals

- Section 05 12 00 Structural Steel Framing
- Section 05 50 00 Metal Fabrications
- Section 05 52 13 Pipe and Tube Railings

Additional bid package requirements:

1. Furnish and Erection of all steel and steel related items, with the exception of items that are embedded in cast in place concrete and masonry, such as lintels, bollards and anchor bolts. These items will be provided under this bid package, but installed under separate bid packages.
2. All decorative and pipe and tube railings will be furnished and installed under this bid package.
3. Layout of all steel and steel related items. CM will provide 2 control points and 1 benchmark only.
4. Includes all required field verification/measurement of all steel and steel related items, including handrails.
5. Furnish all bollards shown for installation by others.
6. Hoisting of all materials.
7. Include delivery of steel handrails to Bid Package 09B Subcontractor and pick-up and delivering to jobsite for installation under this Bid Package.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 06

Millwork

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Millwork** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B

Division 06 – Wood, Plastics, and Composites

- Section 06 41 00 Architectural Wood Casework

Division 07 – Thermal & Moisture Protection

- Section 07 92 00 Joint Sealants

  As it relates to filling joints at millwork,casework and countertop applications and at dis-similar materials abutting work of this bid package. This includes all installed items to the finished surface it abuts.

Division 10 – Specialties

- Section 10 56 17 Wall Mounted Standards and Shelving

Division 11 – Equipment

- Appliances (Furnished By Owner)

  As it relates to the coordination of sizes.

Division 12 – Furnishings

- Section 12 36 00 Countertops

Additional bid package requirements:

1. Bid package will include furnishing and installation of all millwork, plastic laminate and solid surface including integral sinks in bathroom vanities if shown.
2. Hoisting of all materials.
3. Furnish and Install all countertop brackets.
4. Furnish and Install all 2x bases for all Millwork.
5. Furnish and Install all closet rods and shelving in Closets/rooms as shown.

6. Furnish and Install complete the Reading House and the 2- Plam Houses in the Childrens Area including the upholstered cushions at the Plam Houses. See sheet A1-0, A7-1 and A7-2.
7. Furnish and Install complete the 2 Faux Tree Columns and the Kiln Dried Real/Live Tree in the Children's Area See A1-0, A7-1, A7-2 and A7-4.
8. Furnish and Install Quartz Countertops, QZ-1, at both Display Cases at sill/base of opening. Display Cases shown on 10/A7-2 Keynote 10.1200.01. The Sill/Countertop will need to be 1 piece that sits between the track. There will be 2 pieces of sills/countertops total for both display cases. Include in your bid 2 each pieces of 5'-0" long by approximately 1'-10" deep countertop per spec thickness that will be installed on ¾" plywood provided by others. Include field trimming of countertop material to fit between the installed track. Display Glass and Track systems is by others.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 07

Metal Wall & Roof Panels

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Metal Wall & Roof Panels** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements

Division 01 – General Requirements

Appendix B

Division 07- Thermal & Moisture Protection

- Section 07 41 13 Metal Roof Panels (including Roof Insulation)
- Section 07 42 13 Metal Wall Panels
- Section 07 62 00 Sheet Metal Flashing and Trim
- Section 07 92 00 Joint Sealants
  - As it relates to filling joints/seams in this bid packages work and at dis-similar materials abutting work of this Bid Package. Example: At Column Line E on elevation 3 on sheet A3.0 metal panel abuts masonry. Include the caulking between the masonry and metal panel. This is an example and is to be considered typical at all locations that similar situations occur.
- Expansion Control

  As it relates to expansion control requirements in roofing and metal wall panel applications.

Division 09 – Finishes

- Section 09 21 16 Gypsum Board Assemblies
  - As it relates to Furnish and Install of Z-channels on CMU for installation of metal panels on CMU.

Additional bid package requirements:

1. Hoisting of all materials.
2. Include ALL flashing and sheetmetal shown on the drawings complete regardless of the location shown.
3. Layout of all related items. CM will provide 1 site benchmark only.
4. Furnish and Install at locations per the Roofing Manufacturer snow guards per Metal Roof Spec.
5. Furnish and Install both Z-furring on CMU and 2” Rigid Insulation at CMU between Z-furring at all Wall Panels.
6. It is the responsibility of this Bid Package to make all installations water-tight.

7. Cold weather requirements, including enclosures and protection of building finishes during this scope of works process.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 08

Storefronts/Glazing

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Storefronts/Glazing** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B

Division 07 – Thermal & Moisture Protection

- Section 07 92 00 Joint Sealants
  As it relates to filling joints/seams at all glass/glazing applications and abutting dissimilar materials. This Bid Package Subcontractor will furnish and install backer rod as required and joint sealant around the perimeter of all products in this Bid Package at the interior and exterior of the item(s) at minimum. If joint sealants are shown on details of the project at items within this scope of work above that called out in this section than the more prevalent shown shall be completed.

Division 08 – Openings

- Section 08 06 71 Door Hardware Schedule
  - As required for Furnish and Install of all hardware for this scope of work (except cylinders, which are installed in this scope of work but provided by others).
- Section 08 11 13 Hollow Metal Doors and Frames
  - As required for coordination of glazing in HM door units.
- Section 08 14 16 Flush Wood Doors
  - As required for coordination of glazing in HM door units.
- Section 08 43 13 Aluminum Framed Storefronts
- Section 08 71 00 Door Hardware
  - As required for Furnish and Install of all hardware for this scope of work (except cylinders, which are installed in this scope of work but provided by

others). Housing for cores and auto operators are furnished and installed in this Bid Package.

- Section 08 80 00 Glazing

Additional bid package requirements:

1. INCLUDE The Two-Sided Double Glass Door Sliding system at the 2- Display Cases, (shown on 10/A7-2 and Keynotes 08.8000.02 and 10.1200.01) Bottom By-Pass Slide/Guide Track, By-Pass Sliding Glass Doors, Top By-Pass Slide/Guide Track and Side Closers that are the CRL Satin Anodized Deep Channel Dust proof rail with bumper D1623A. Sliding track assembly to be similar to C.R. Lawrence Co., Inc Roll-Ezy Double Track Ball Bearing Assembly KV99236. Include Tamper Proof Sliding Glass Door Lock. THIS ASSEMBLY WILL BE ON BOTH SIDES OF THE DISPLAY CASE AREA. THERE WILL BE 4 OF THESE DOUBLE SLIDING GLASS DOOR ASSEMBLIES; 2 ON READING AREA SIDE AND 2 ON THE STACKS SIDE FOR A TOTAL OF 8 PIECES OF GLASS.
2. Provide Hardware complete per Sections above for Storefronts.
3. Furnish and Install Auto Door Operators.
4. Include providing raceway(s) in Frames of Storefront doors for access control cabling and coordination with Access Control Subcontractor.
5. This Bid Package will furnish, install and remove temporary plywood closures at all framed openings with-in this bid package that glass has not been installed.
6. It is the responsibility of this Bid Package to make all installations water-tight.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 08A

General Trades

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **General Trades** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Procurement and Contracting Requirements

Division 01 – General Requirements

Appendix B

Division 07 – Thermal and Moisture Protection

- Section 07 11 13 Bituminous Dampproofing
- Section 07 13 00 Sheet Waterproofing
- Section 07 25 00 Weather Barrier (AIR BARRIER)

Division 08 – Openings

- Section 08 06 71 Door Hardware Schedule
  - As required for Furnish and Install of all hardware for this scope of work Hollow Metal, Wood Doors. Cylinders are furnished here for Storefront Door units but installed in BP 08.
- Section 08 11 13 Hollow Metal Doors and Frames
- Section 08 14 16 Flush Wood Doors
- Section 08 71 00 Door Hardware
  - As required for Furnish and Install of all hardware for this scope of work (except cylinders, which are furnished here only for Storefront Door units but installed in BP 08).

Division 10 – Specialties

- Section 10 11 00 Visual Display Units
- Section 10 14 00 Signage
- Section 10 21 13.19 Plastic Toilet Compartments
- Section 10 26 00 Wall and Door Protection
- Section 10 28 00 Toilet, Bath & Laundry Accessories
- Section 10 44 00 Fire Protection Specialties

- Section 10 75 00 Flagpoles

Division 11 – Equipment

Appliances (Provided By Owner)

- As it relates to the receiving, unloading and installation of owner provided appliances. The installation of the MEP requirements will be provided under separate bid packages.

Division 12 - Blinds

Section 12 24 00 Window Shades

Division 28 – Electronic Safety & Security

Section 28 41 00 Access Control and Cameras

Division 32 – Exterior Improvements

Section 32 17 23 Pavement Markings
Section 32 92 00 Turf and Grasses
Speed Bumps
Fencing and Gates

Additional bid package requirements:

1. Furnish and Install all requirements of the Access Control System.
2. Bid package will include furnishing and installation unless otherwise indicated.
3. Include all labor and material for Site handicap parking signs and posts (including concrete).
4. Bid package will include, FINAL CLEANING per specifications but not be limited to cleaning of interior and exterior of glass, doors, frames/windows, walls, floors, etc.
5. Include Book Drop complete.
6. Furnish and Install all Fencing and Gates complete. Reference exterior Mechanical areas and Dumpster Enclosure.
7. Furnish and Install 2 speed bumps; 72” long portable rubber with yellow stripes, end caps and spikes.
8. Includes the purchasing, installation and removal of the project sign(s). Refer to the plans and specifications. Include minimum 2-each 4’x8’ alumapanel board style one piece sign mounted on treated plywood backing with 4”x4” and 2”x4” treated wood framing. Ground mount either; posts in concrete or wood framed ground mount base. Jpeg file (or similar) to be provided by Architect for Sign Graphics.

9. Bid package will include the installation, periodic maintenance as required and removal of a 6'-0" tall chain link panel temporary fence. Include an allowance of $4,000.00 for extra fence at future lay-down areas.
10. Include bondo and prep at door frames ready for paint as required/needed.
11. Provide all landscaping complete per plans and specs including rock, filter fabric and planting soil at the building planters.
12. This subcontractor shall provide Access Control and Cameras complete per plans and specs. All Rough-in and cabling is by others.
13. Include all necessary labor, material and equipment to install 2 each double sided "Library This way" Signs offsite including posts, signs, concrete for posts, and sign brackets.
14. Furnish and Install all Signage for the project. Included but not limited to Code Signage on sheet G0-1, Site wayfinding signage sheet C201 and C701, the Height Clearance sign at the drive-under canopy and Exterior Wall Signage Sheet A3-0 and the "Reading House" Signage on sheet A7-1.
15. Furnish and Install all bike racks (2 – 5 bike- bike racks).
16. Furnish and install Knox box (1 ea) as required See A3-0, with the aid of other Bid Package Subcontractors. See 087100-8, 2.21

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive, and will not be accepted.

Bid Package 09

Metal Studs/Gyp Board/Ceilings

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Metal Studs/Gyp Board/Ceilings** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B

Division 05 – Metals

- Section 05 31 00 Steel Decking
  - Steel Decking is provided by Owner and installed in this Bid Package.
- Section 05 44 00 Cold-Formed Metal Trusses

Division 06 – Wood, Plastics and Composites

- Section 06 10 10 – Non-Structural Rough Carpentry
- Section 06 83 13 – Fiberglass Reinforced Panel

Division 07 – Thermal & Moisture Protection

- Section 07 21 00 Thermal Insulation
  As it relates to insulation requirements of metal stud and metal furred walls, ceilings, and roof spaces.
- Section 07 92 00 Joint Sealants
  As it relates to filling joints/seams at gypsum board applications and abutting dissimilar materials.
- Expansion Control
  As it relates to expansion control requirements in gypsum board applications.

Division 08 – Openings

- Section 08 11 13 Hollow Metal Doors and Frames
  - As related to Installing HM frames in Metal Stud Walls

Division 09 – Finishes

- Section 09 21 16 Gypsum Board Assemblies
- Section 09 51 00 Acoustical Ceilings

- Section 09 84 30 Sound Absorbing Wall and Ceiling Units

Additional bid package requirements:

1. Hoisting of all materials.
2. Include Painted/Vinyl Stencil of Fire Walls/Smoke Walls as required on sheetrock.
3. Installation, maintenance and removal as directed by CM of floor protection during the tape and finishing process.
4. Furnish and Install ¾" thick plywood on top of metal stud walls at the bottom of the two Display Cases at 10/A7-2. Approximate size of each piece = 5'-0" wide x 2'-0" deep.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 09A

Flooring

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Flooring** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B
Division 03 – Concrete

- Section 033000 Cast in Place Concrete
  - As it relates to floor patch required on concrete slabs.

Division 07 – Thermal & Moisture Protection

- Section 07 92 00 Joint Sealants
  As it relates to filling joints/seams at flooring applications and where this Bid Packages work abuts dis-similar materials.
- Expansion Control
  As it relates to expansion control joints in flooring applications.

Division 09 – Finishes

- Section 09 05 61 Common Work Results for Flooring Preparation
- Section 09 30 00 Tiling
- Section 09 65 00 Resilient Flooring (and Base)
- Section 09 68 13 Tile Carpeting

Additional bid package requirements:

1. Layout of all flooring and related items including expansion joints in floor applications.
2. Includes all required floor patching, leveling and grinding as needed whether indicated or not.
3. Includes waxing/sealing of floor products as per the specifications.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 09B

Painting

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Painting as** required per the contract documents, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B

Division 05 – Metals

- Section 05 12 00 Structural Steel Framing
  - As it relates to bondo-izing, priming and painting steel products exposed to view and handrails.
- Section 05 50 00 Metal Fabrications
  - As it relates to bondo-izing, priming and painting steel products exposed to view and handrails.

Division 07 – Thermal & Moisture Protection

- Section 07 92 00 Joint Sealants

  As it relates to filling joints/seams in painted walls, floors and ceiling applications and at all dis-similar materials with-in painted areas.

Division 09 – Finishes

- Section 09 91 13 Exterior Painting
- Section 09 91 23 Interior Painting

Additional bid package requirements:

1. Includes the protection of all flooring, walls, doors, frames, fixtures and devices during the painting process.
2. Includes, but not limited to, the caulking of all door frames, and the interior joint between windows and drywall.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 21

Fire Sprinkler

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Fire Sprinkler** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B

Division 07 – Thermal & Moisture Protection

- Firestopping
  As it relates to the requirements of the Fire Sprinkler system.

- Section 07 92 00 Joint Sealants
  As it relates to requirements of this bid package.

Division 21 – Fire Sprinkler System COMPLETE

Division 22 Plumbing, 23 HVAC, 26 Electrical, 28 Electronic Safety & Security – As required for coordination

Additional bid package requirements:

1. This bid package will include all related fire suppression items from 1'-0" above finish floor.
2. Include all required permits, tap fees, inspection fees and impact fees.
3. Includes the engineered stamped design of the fire suppression system.
4. Include requirements of the AHJ all relevant Building Codes and all submittals to and approval from the AHJ.
5. Include all required access panels as needed as they relate to the fire suppression/sprinkler system.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 22

Plumbing

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Plumbing** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B

Division 03 – Concrete

- Section 03 30 00 Cast-in-Place Concrete
  As it relates to Thrust blocks or concrete at or behind plumbing piping or materials.

Division 07 – Thermal & Moisture Protection

- Firestopping
  As it relates to the requirements of the plumbing system.
- Section 07 92 00 Joint Sealants
  As it relates to caulking of fixtures with-in this bid package.

Division 11- Equipment

- Residential Appliances (Provided By Others)
  - As it relates to the plumbing requirements/hook-up of the kitchen appliances.

Division 21 – Fire Sprinkler

- As it relates to coordination and other requirements.

Division 22 – Plumbing ALL SECTIONS COMPLETE

Division 23 HVAC, 26 Electrical, 28 Electronic Safety & Security

- As required for coordination

Division 31 – Earthwork

- Section 31 23 00 Excavation and Fill
  As required for the work of this bid package .

Additional bid package requirements:

1. Include all required permits and permit fees, tap fees and impact fees for this scope of work.
2. Provide dewatering as necessary for this scope of work.
3. Offsite removal of related spoils shall be included in this bid package.
4. Include all requirements of tying into structures or other items/piping/work.
5. All underground piping, including but not limited to water lines/mains, sanitary sewer lines/mains, gas lines and fire lines/mains that are within the Building and extending 7'-0" out from the building lines. Including proper trenching and backfilling of these lines.
6. Include all required access panels as needed as they relate to Plumbing.
7. Condensate Piping is by the BP 23 HVAC Subcontractor.
8. Furnish and install sleeves of sufficient size for new underground piping to pass through where required through/under new concrete as required for plumbing items.
9. Include all trenching, backfilling, compaction as required for all related below grade plumbing operations complete.
10. Include all work required for site gas line as required that which is not taken care of by local Gas Utility Company.
11. Furnish and Install Mop and Broom holder at all Mop Sinks Bobrick Model B-223 or equal.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 23 HVAC

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **HVAC** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements
Appendix B

Division 07 – Thermal & Moisture Protection

- Fireproofing
  As it relates to the requirements of the HVAC system through floors, walls, ceilings etc.
- Section 07 92 00 Joint Sealants
  As it relates to the HVAC system and the installed/finished products.

Division 23 – HVAC COMPLETE

Division 21 Fire Sprinkler, 22 Plumbing, 26 Electrical, 28 Electronic Safety & Security
As it relates to coordination and other HVAC requirements

Additional bid package requirements:

1. This Bid Package Contractor will provide and maintain a temporary heating and cooling system. The temp heating system will maintain a heating temperature at all times of 65 degrees and 20% RH during finishing operations. The cooling system will maintain a maximum of 75 degrees and a maximum of 60% RH during finishing operations. The NEW HVAC system may be utilized if the system is cleaned, temporary filters two MERV higher than specified are used and these filters are replaced bi-weekly during construction period and properly maintained and returned to like new conditions with no determent to the manufacturer's warranty. If the buildings electrical system is not able to provide enough power for electrical temporary heating equipment then provide fuel fired heaters or propane heaters as needed to provide requirements as indicated above.

2. Include all required access panels as they relate to HVAC whether shown or not. It is the SOLE responsibility of this BP Sub that all HVAC items required to be accessible are accessible.
3. THIS BID PACKAGE SHALL REVIEW DURING BIDDING all valves shown to be installed on/within the HVAC piping system. If valves are not shown that isolate each floor and each level, include extra valves to accommodate isolation of each level and each floor.
4. Include all trenching, backfilling, compaction as required for all related below grade HVAC operations complete.
5. Condensate piping complete is included in this Bid Package.
6. Furnish and install sleeves/blockouts of sufficient size for HVAC items to pass through/under new concrete, walls, roofs, etc. where required for the HVAC system.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 26

Electrical

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Electrical** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Procurement and Contracting Requirements
Division 01 – General Requirements
Appendix B

Division 02 – Existing Conditions

- Section 024113 – Site Demolition
  - As it relates to Site Electrical demolition

Division 07 – Thermal & Moisture Protection

- Firestopping
  - As it relates to the requirements of this Bid Package through walls, ceilings, floors etc..
- Section 07 92 00 Joint Sealants
  - As it relates to the requirements of this Bid Package.

Division 11- Equipment

- Residential Appliances (Provided By Others)
  - As it relates to the electrical requirements/hook-up of kitchen appliances.

Division 21 Fire Sprinkler, 22 Plumbing, 23 HVAC

As it relates to Electrical powering/hooking-up of Mechanical items/systems.

Division 26 – Electrical COMPLETE

Division 28 – Electronic Safety and Security COMPLETE

Division 31 – Earthwork

- Section 31 23 00 Excavation & Fill
  - As required for work of this bid package.

Additional bid package requirements:

1. Include all required permits and permit fees, tap fees and impact fees for this scope of work.
2. Provide for dewatering of all electrical work as required during construction.
3. Provide and maintain temporary power as explained:
    a. At the jobsite trailer locations (maximum 3) hook-up trailer to temporary power.
    b. At the start of footings one each Service location at each building with a minimum of six (6) 20 amp GFCI duplex receptacles will be required.
    c. As the second floor of each building becomes accessible, service is to be expanded so that power is accessible to any location with-in 100' either way.
    d. As the third floor of each building becomes accessible, service is to be expanded so that power is accessible to any location with-in 100' either way.
4. Provide and maintain interior temporary lighting as required by provisions of OSHA CFR 1926 Subpart D standard number 1926.53 (Table D-3) and/or the specifications (Pre-Installation Conference with CM required). Excluded are Exterior Work applications that include but are not limited to, concrete work, brick work, EIFS work, metal panel work, roofing and sheet metal work, Storefront/Curtainwall/Glazing work etc.
5. Include an allowance of $10,000.00 for electrical work not called for in plans and specs.
6. This Bid package shall include conduit for all trades/bid packages.
7. Includes all required underground work for electrical, data and communications.
8. Offsite removal of all related spoils shall be included in this Bid Package.
9. Install all required access panels as they relate to Electrical whether shown or not.
10. Furnish and install sleeves of sufficient size for new conduit to pass through where required through/under new concrete where required for electrical items.
11. Include all trenching, backfilling, compaction as required for all below grade electrical work complete.
    a. When electric lines install under rock, concrete or asphalt it shall be backfilled with rock compacted.
    b. When electric lines install under dirt/landscaping it shall be backfilled with dirt and compacted.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 31
Site Work/Site Demolition

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Site Work/Site Demolition** as required per the contract documents, common requirements, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B
Division 02 – Existing Conditions

- Section 024113 Site Demolition
  - Exception to this section is electrical utility demolition which is by others

Division 03 – Concrete

- Section 03 30 00 Cast-in-Place Concrete
  - As required for providing/coordinating subgrade for all concrete work.

Division 31 – Earthwork

- Section 31 10 00 Site Clearing
- Section 31 23 00 Excavation and Fill
- Section 31 24 00 Erosion and Sediment Control

Division 32 - Exterior Improvements

- Section 32 11 00 Cast in Place Concrete for Sitework
  - As required for providing/coordinating subgrade for all concrete work.
- Section 32 12 16 Asphalt Paving
  - As required for coordination of subgrade for BP 32 Asphalt scope of work.
- Section 32 92 00 Turf and Grasses
  - As required for coordination of subgrade of topsoil areas and placing of topsoil.

Division 33 – Utilities

- Section 33 10 00 – Water Utility Distribution
- Section 33 31 00 – Sewer Utility Sewer Piping
- Section 33 41 00 – Storm Utility Drainage Piping
- Section 33 41 01 – Subdrainage
- Section 33 49 00 – Storm Utility Drainage Structures

Additional bid package requirements:

1. Includes all demolition, saw-cutting as required, capping of demolished utility lines (except electrical lines) and removal of all required concrete, storm piping, utility piping, trees, asphalt etc. identified by the contract documents.
2. Include the Construction entrance complete, include maintenance as required by the SWPPP, the State of MO and the Federal Government as well as the Plans and Specs. Removal as directed by CM.
3. Includes the backfilling, per plans and specs, of all concrete walls. Backfill of concrete footings, curb & gutter, walks and other site concrete items will be in Bid Package 03 Concrete.
4. Include sloped/benched excavation as required for all concrete walls.
5. Include cutting and stockpiling of existing topsoil to location directed by CM. Include furnishing extra topsoil above existing as required and placing and machine grading of all required topsoil for the project.
6. Includes the furnishing, installation, maintenance and removal of all erosion control requirements, including install and removal of construction entrance, filing and payment of DNR permit.
7. Include all required permits, tap fees and impact fees.
8. Fire line shall be installed to a point 1'-0" above finish floor including the flange as part of this bid package.
9. This Subcontractor will bring all utility lines to a point within 5'-0" of the building and connect to building plumbing lines.
10. Include temporary water installation and removal as directed by CM.
11. This contractor will be required as directed by CM to do "re-grading touch-up" periodically which will entail smoothing of ruts made by others equipment, light vehicle travel, other miscellaneous disturbance of subgrade soil and minor regarding as needed. Re-grading touch-up may involve the entire site or be localized areas. Include in your bid an amount equivalent to 3 total site touch-ups to be performed at any time during the project.
12. Include the perimeter drain around the building with base rock backfill and filter fabric around pipe hooked into the storm system as shown.
13. Include the storm drains system complete. Include the connection required to attach the storm drain system to the building downspout system.
14. **Complete** Site subgrade is to be achieved per schedule and prior to initial de-mobilization by this Subcontractor with emphasis being put on the completion of the building pad.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

Bid Package 32

Asphalt Paving

Provide all material, labor, equipment, tools, supervision and other items necessary to complete all **Asphalt Paving** as required per the contract documents, bidding documents, this Scope of Work, and other items as issued by Addenda. Contract specifically includes, but is not limited to, the following:

Division 00 – Bidding & Contract Requirements
Division 01 – General Requirements
Appendix B

Division 31 – Earthwork

Section 31 23 00 Excavation and Fill

As required for base rock under asphalt paving and curb and gutter

Division 32 – Exterior Improvements

Section 32 12 16 Asphalt

Additional bid package requirements:

1. This bid package includes furnish and install per AHJ and plans and specs of all crushed stone under all asphalt paving installed above subgrade provided by BP 31 Subcontractor and crushed stone under all concrete curb and gutter to subgrade where shown.

No exclusions to a bid package will be allowed. If any exclusions are listed on a bid form, the bid will be identified as non-responsive.

End of Section 00 20 00

SECTION 00 21 13 – INSTRUCTIONS TO BIDDERS

1. THE WORK

Plans and Specifications are the work required, upon the conditions set forth in the Advertisement for Bidders, the complete set of Construction Documents and the information here-in. **The Project** consists of Construction of a new 22,000 sqft facility for the Barry-Lawrence Regional Library. It includes, but not limited to; Sitework, Site Utilities, Site Concrete and Asphalt, Concrete Building Foundation Systems, Masonry, Misc. and Structural Steel, Rough Carpentry, Millwork, Standing Seam Roofing and Metal Wall Panels, Hollow Metal and Wood Doors, Aluminum Framed Entrances and Windows, Finish Hardware, Metal Stud Framing, Gypsum Board, Acoustical Ceilings, Tile, Resilient Flooring, Painting, Fire Sprinkler, Plumbing, HVAC, Electrical and Special Systems.

2. SECURING PROJECT DOCUMENTS

All Bidders are hereby directed to:

**Tri-State Area Contractors Association, Joplin, MO (417-627-9392)
**Engineering Reprographics, Springfield, MO (417-869-2222)
**R.E. Smith Construction; www.resmithconst.com (417-623-4545)

**Hard Copies of plans and specifications and other related contract information may be obtained at the bidders own expense through any of the above ** marked locations, or as the bidder so chooses.

Any questions related to obtaining bidding or bid documents are to be directed to the CM:

R.E. Smith Construction Company

Attn: Clint Walton
1036 W. 2nd Street
Joplin, MO 64801
(417) 623 4545
estimating@resmithconst.com

3. INTERPRETATION OF CONTRACT DOCUMENTS

A. If any person contemplating submitting a bid for construction of the Work is in doubt as to the true meaning of any part of the proposed Contract Documents, or finds discrepancies in, or omissions from any part of the proposed Contract Documents, he shall submit to the CM a request for interpretation thereof not later than five (5) days before bids will be opened. The person submitting the request shall be responsible for its prompt delivery.

B. Interpretation or correction of proposed Contract Documents will be made only by Addendum. Distribution of Addenda will be via electronic distribution from the CM. Neither the Owner nor Architect will be responsible for any other explanations or interpretations of the proposed Contract Documents other than that via Addenda. Bidders shall not assume that a discrepancy or conflict thereby voids or omits any item entirely from the contract.

C. Discrepancies, conflicts, ambiguities, and errors, or issues which may have more than one interpretation, should initially be submitted to the CM who will forward the issue to the Architect who will make the interpretation. In absence of an interpretation issued by addendum, the default position shall be for the bidder to bid the more restrictive and/or more costly interpretation which gives the owner the option of either. Items in the drawings that are not specifically called out in the drawings but can be reasonably inferred to be a part of the project will be considered a part of the Work.

4. SUBSTITUTIONS

A. Specific materials and manufactures for all disciplines have been specifically selected to meet requirements and substitutions will meet all requirements to be considered acceptable. Substitution requests provided to the CM filled out entirely on CSI Form 13.1A will be reviewed on these bases and any products not approved in the bidding process as described herein will not be accepted during the execution of the Work and it will be the responsibility of the Subcontractor requesting substitution to provide the specified or approved product. Substitution requests that are not approved by addenda during the bidding process are considered rejected.

5. ADDENDA

A. Addenda will be released by the CM to be distributed to ALL LOCATIONS DESCRIBED ABOVE at the close of business on Friday's during the bidding process. Revisions, clarifications, interpretations, and substitution request approvals will be contained in the addenda.

6. EXAMINATION OF DOCUMENTS AND SITE OF WORK

A. Before submitting a bid, each bidder shall examine the Drawings carefully, shall read the Specifications and all other proposed Contract Documents, and shall visit the site of the Work. Each bidder shall fully inform himself prior to bidding as to the existing conditions and limitations under which the Work is to be performed. Bidders shall review all documents made available to him by the owner, and shall include in his bid a sum to cover the cost of items necessary to perform the Work to a completed and operational condition

and as set forth in the proposed Contract Documents. No allowance will be made to a bidder because of lack of such examination or knowledge that is determined by the architect that could have been reasonably inferred by inspection. The submission of a bid will be considered as conclusive evidence that the bidder has made such examination.

7. PREPARATION OF BIDS

A. In order to receive consideration, make bids in accordance with the following:

B. Make bids upon the form provided (Section 00 41 13 Bid Form), properly signed and with all items filled out. Do not change the wording of the bid form, and do not add words to the bid form. Unauthorized conditions, limitations, or provisions attached to the bid may be cause for rejection of the bid. If alterations by erasure or interlineations are made for any reason, explain over such erasure or interlineations with a signed statement from the bidder. See section 00 11 13 Advertisement for Bids and section 00 19 00 Submission of Bids for information on bid delivery date and methods.

C. Hand Delivered and Mailed Bids

   a. Bids must include completed bid form Section 00 41 13. No bids received after the time fixed for receiving them will be considered. Late bids will be discarded.

D. Optional Bidding Method

   a. Electronic Mail (e-mail) and facsimile bids **will NOT be allowed**.

E. Telephone bids **will NOT be** accepted.

F. Address bids to and deliver to the address as given, on or before the day and hour set for receiving the bids. Enclose mailed and hand delivered bid in a sealed envelope bearing the information as set forth in the Submission of Bids Section 00 19 00. Submit only the signed copy of the bid. It is the sole responsibility of the bidder to see that the bid is prepared and received properly and on time.

G. All proposals must be properly signed and submitted as set forth in the Instructions to Bidders. Each Bidder shall specify in his proposal, in figures, the lump sum price or the unit price for each of the separate items listed in the proposal. The proposal shall not contain interlineations, alterations, or erasures except as noted in Paragraph below. The Bidder shall show the products of the respective unit prices and quantities in the amount column provided for that purpose. These extensions shall be totaled and in case of errors or discrepancies in extensions, the unit prices shall govern. All entries on the proposal form shall be in ink or typed. All errors in extensions or totals will be corrected by the CM and such corrected extensions and totals will be used in comparing bids.

H. A Bidder may alter or correct a unit price, lump sum bid, or extension entered on the

proposal form by crossing out the figure with ink and entering a new unit price, lump sum bid, or extension above or below in ink, and initialing the alteration or correction. If an alteration or correction of a unit price or lump sum bid is **not** initialed, the original unit price or lump sum bid will be assumed to be correct. All corrections must be made before any bids have been opened.

I. No Bidder shall stipulate in his proposal any conditions not contained in the specifications or standard proposal form contained in the contract documents.

J. Bids are to be presented by the method(s) allowed, on the bid date and at the bid time delivered to the place specified in the Advertisement for Bids or announced under separate cover. Bidders shall be responsible for actual delivery of proposals during business hours, and it shall not be sufficient to show that a proposal was dispatched in time to be received before scheduled closing time for receipt of bid.

8. SUBMISSION OF BIDS

A. Bids shall be delivered to the CM, R.E. Smith Construction Company, in accordance with Section 00 19 00.

B. Bidders are allowed to bid Multiple Bid Packages; **each bid package is to be sent independent of the other bid package**. For example, if Subcontractor A wishes to bid, Bid Package 04 and Bid Package 05 they would submit one Bid for Bid package 04 and a separate Bid for Bid Package 05. Bids that are received with more than one bid package identified will be rejected.

9. WITHDRAWAL OF BIDS

A. A bidder may withdraw his bid, either personally or by written request, at any time prior to the scheduled time for reading bids.

B. No bidder may withdraw his bid for a period of **Forty Five calendar days** after the date set for opening thereof, and bids shall be subject to acceptance by the Owner during this period.

7. **AWARD OR REJECTION OF BIDS**

A. General: The Subcontract, if awarded, will be awarded to the **lowest and best responsible qualified bidder** complying with the terms set forth in the contract documents, in the best interest of the Owner and CM, subject to the CM and Owner's right to reject any or all bids and to waive informality and irregularity in the bids and in the bidding. The Contract Sum may be determined by the sum of the base bid, and/or the sum of any or all bid alternates, **in any order**, which the Owner may chose to add or delete from the base bid.

B. Conditions of Award: Award of Contract will be based on the following factors in

combination and in no particular order:

1. PROPOSED CONTRACT AMOUNT: Award will be based upon the best value of sum of base bid and any or all bid alternates the Owner may wish to accept. The Owner may accept Bid Alternates in any order and combination.
2. BIDDERS QUALIFICATIONS: Award of Contract will be made to a bidder who is experienced and qualified in similar size and types of projects, with a history of successful projects completed on time and with supportive references. The goal of this section is to maximize likelihood of project success and minimize risk to the owner:
3. BEST BID EVALUATION: includes a subjective evaluation, by the CM provided to the Owner for approval, based on best qualified bid and:
    1. Compliance with bid requirements.
    2. Financial history and ability to remain financially strong during the construction and warranty period.
    3.A bidder who is unable to demonstrate ability, and/or history to schedule, manage, and complete the project through cooperative, systematic process, according to the Contract, may be disqualified and have their bid rejected.
    4. Performance history of the Subcontractor with Owner and the CM.

*See Section 00 20 00 Scopes of Work – for Further items related to Evaluation of Subcontractor bids

10. EXECUTION OF AGREEMENT

A. The form of agreement between the CM and subcontractor shall be the Contractor's/CM's form. No erasures, modifications, changes etc. to this document will be allowed. If the Subcontractor marks-up or attempts to make changes to the agreement the CM will charge $500/hour for review and consideration of the changes. An emailed Notice TO Proceed may be used as notice of award and the Subcontractor agrees that if given a Notice TO Proceed, they will start work immediately, the same as if they had an executed contract.

B. The Subcontractors to whom Contracts are awarded shall, within seven calendar days after notice of award and receipt of Agreement forms from the CM, sign and deliver required copies to the CM. The date of the Agreement signed by the CM and Owner starts the clock on the Construction Time. However, the date of Substantial Completion and Final Completion is fixed by the Project Schedule. Submittal Data is to be submitted no later than that date as set forth by the CM.

C. At or prior to delivery of the signed Agreement, the bidder to whom the Subcontract is awarded shall submit to the CM those Certificates of Insurance required by the Contract Documents and as are required by the Owner.

D. Certificates of Insurance shall be approved by the CM and the Owner before the successful bidder may proceed with the Work. Failure to provide Certificates of Insurance in a form satisfactory to the CM and Owner shall subject the successful bidder to loss of time from the allowable construction period equal to the time of delay in furnishing the required

material. Refusal of successful bidder to provide certificates of insurance that is satisfactory to the CM and Owner shall be cause for disqualification of this bid.

11. CONSTRUCTION TIME AND LIQUIDATED DAMAGES

The CM requires each sub-contractor to coordinate **all work** and cooperate with the CM and Owner regarding partial occupancy for purposes of installing furniture and equipment, and prepping of spaces for full occupancy.

A. Commencement: It is expected that Subcontracts or a Notice to Proceed will be awarded within (5) days of bid open opening, but no later than (30) thirty days, and that the Work shall commence immediately after the Notice to Proceed.

B. Real damages, Delay damages and Liquidated damages will be in effect for this project.

C. Weather Days: The Subcontractor agrees to comply consistently with the Project Schedule provided by the CM. Schedule compliance is a condition of the bid. The Bidder agrees the days to complete the project includes allowance for inclement weather. No extension to the schedule will be allowed due to weather or labor relations issues unless the owner and architect determine they are extreme exceptions to common industry tolerances. Determining Common Industry Tolerance is a subjective judgment made by the Architect with documentation provided from the CM.

12. MATERIALS AVAILABILITY

A. Prior to bidding, the Subcontractor shall confirm with their subcontractors and material suppliers that all materials, suppliers and subcontractors, which may impact the critical path of the Construction Schedule (See Section 00 20 00), are able to be delivered and/or provided such that the project schedule and substantial completion date are not adversely affected. The subcontractor shall immediately notify the CM and the CM will notify the Architect and/or Owner of any such conflicts and adversities, prior to issuance of final addendum, prior to bidding.

B. The Subcontractor bears sole and full responsibility for compliance with terms of the contract for time and completion, (except as such terms may be modified by contract modification procedures upon timely notification by the Subcontractor.)

END OF SECTION 00 21 13

SECTION 00 25 13 - PREBID MEETINGS

1.1 PREBID MEETING

The CM and Architect/Engineer will conduct a Pre-bid meeting at 1:30 pm CT on June 23, 2021 at the Pierce City Library Conference Room at 101 N. Walnut St., Pierce City, MO 65723. See Section 00 11 13. It may also be attended via Video Conference by following this link: https://us02web.zoom.us/j/84478886700

A. Attendance:

1. Subcontractors: Attendance at Pre-bid meeting is recommended and will be used for post-bid qualifications see Section 00 11 13.

B. Agenda: Pre-bid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:

1. Procurement and Contracting Requirements:
   a. Advertisement for Bids.
   b. Instructions to Bidders.
   c. Bid Form and Attachments.
   d. Bid Submittal Requirements.

2. Communication during Bidding Period:
   a. Obtaining documents.
   b. Bidder's Requests for Information.
   c. Bidder's Substitution Request/Prior Approval Request.
   d. Addenda.

3. Contracting Requirements:
   a. Agreement.
   b. The General Conditions.
   c. The Supplementary Conditions.
   d. Other Owner requirements.

4. Construction Documents:
   a. Scopes of Work.
   b. Temporary Facilities.
   c. Use of Site.
   d. Work Restrictions.
   e. Alternates, Allowances, and Unit Prices.
   f. Substitutions and Material Selection

5. Separate Contracts:
   Bid packages
   a. Work of Other Contracts.

6. Schedule:

a. Project Schedule.
b. Contract Time.
c. Liquidated Damages.
d. Other Bidder Questions.

7. Site/facility visit or walkthrough.

C. Minutes: The CM will record and may distribute meeting minutes and the sign in sheet to attendees via addenda. Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.

END OF DOCUMENT 00 25 13

SECTION 00 31 32 - GEOTECHNICAL DATA

PART 1 GENERAL

1.1 GEOTECHNICAL DATA

A. The geotechnical data and all referenced attachments are a part of the Procurement and Contracting Requirements. The geotechnical data provides information for the Bidder's convenience and is intended to supplement the Bidder's own investigations. The geotechnical data and its attachments are not a part of the Contract Documents.

B. Because subsurface conditions indicated by the soil borings are a sampling of the project site, the Owner, The Architect, the Architect's consultants, and the firm reporting subsurface conditions do not warranty the conditions below the depths of the borings or that the strata identified by the borings are typical of the entire site. Any party using the geotechnical data in the soil borings and geotechnical report shall accept full responsibility for its use.

C. A geotechnical investigation report for the site is located in the appendices of the project manual.

1. The opinions expressed in the report are those of a geotechnical engineer and represent their interpretations of subsoil conditions, tests, and results of analysis conducted by the geotechnical engineer. The Owner is not reponsible for interpretations or conclusions drawn from the data.
2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that are encountered.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 00 41 13 – BID FORM

LUMP SUM BID for BID PACKAGE # _____

Date: _____

TO: **R.E. Smith Construction Company**
1036 W. 2nd Street
Joplin, MO 64802
(417) 623-4545

COMPANY NAME:

_____

(Hereinafter called "Bidder")

1. **The Bidder,** in accordance with the Drawings and Specifications, prepared by Paragon Architecture and R.E. Smith Construction Company for the project entitled:

Barry-Lawrence Regional Library:
Monett Branch Library

having examined the Drawings and Specifications with related documents and the site of the proposed work, and being familiar with all the conditions pertaining to the construction of the project and related work, including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies to construct the project in accordance with the Contract Documents, within the time set forth herein at the prices stated below. These prices are to cover all expenses, including any and all taxes and fees required by local ordinances, which are incurred in performing the work required under the Contract Documents, of which this Bid is a part.

2. **ADDENDA:**
The Bidder acknowledges receipt of the following addenda:

Addendum No. _____ dated _____

Addendum No. _____ dated _____

Addendum No. _____ dated _____

Addendum No. _____ dated _____

3. BID PRICING:

In the following Bid, the amount shall be shown in both words and figures.

A. BASE BID:

The Bidder agrees to furnish all labor, materials, tools, and equipment required to complete the construction work shown on the Drawings and called for in the Specifications for the sum of:

_____

_____ Dollars

$(_____)

B. ALTERNATES:

a. Alternate #1 VOLUNTARY ALTERNATE:

ADD/DEDUCT/NO CHANGE $ _____

b. Alternate #2 VOLUNTARY ALTERNATE:

ADD/DEDUCT/NO CHANGE $ _____

C. PERFORMANCE AND PAYMENT BOND:

Bidder shall state only the additional cost for adding a performance and payment bond to their Base Bid Pricing. $_____

Bidder shall state only the additional or reduced cost for adding a performance and payment bond to their Alternate Bid Pricing. $_____

D. UNIT PRICES:

Complete this section only when it is applicable to the Bid Package.

1. Excavation of unclassified or unsuitable material haul off site $_____/cu.yd.
2. Excavation of unclassified or unsuitable material stockpile on site $_____/cu.yd.
3. Additional Fill; in place from off-site material. $_____/cu.yd.

4. Engineered Fill; in place from off-site material. $_____/cu.yd.

5. Additional Fill; in place from on-site material. $_____/cu.yd.

6. Rock excavation:
   1) Mass Rock $_____/cu.yd.

   2) Trench Rock up to 10 feet below adjacent grade. $_____/cu.yd

4. **BIDDER'S SIGNATURE:**

_____
Signature of Bidding Company Officer

_____
Printed Name of Officer

_____
Telephone Number

Licensed to do business in Monett, MO:
Yes: _____ No: _____

_____
Address for Communications

(Each Bidder must complete the bid form by manually signing on the proper signature line above and supplying the required information called for in connection with the signature. The information called for is necessary in the proper preparation of the contract and performance bond. Each in the Bidder must supply the data called for "Statement of Bidder's Qualifications.") BY SIGNING ABOVE the Bidder acknowledges all descriptions and understands the items explained and described in the BID FORM INFORMATION document included as pages 4 through 6 of this Bid Form.

NO MODIFICATIONS TO THE BID FORM ARE ALLOWED UNLESS SPECIFICALLY ALLOWED BY ADDENDA AND ONLY THEN SHALL MODIFICATION(S) BE ALLOWED. ONLY PAGES 1-3 OF THE BID FORM NEED TO BE SUBMITTED. NO QUALIFICATIONS, SUMMARY'S OF WORK, ETC., SHALL BE ATTACHED TO THE BID FORM OR INCLUDED WITH THE BID FORM IN THE SEALED ENVELOPE OF BID.

BID FORM INFORMATION

1. UNIT PRICES:
   For changing specified quantities of work from those indicated by the Contract Drawings and Specifications, upon written instructions of the Owner and CM, the following Unit Prices shall prevail in accordance with the General Conditions.

   The following Unit Prices shall include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, and all costs require to cover the finished work of the several kinds of work called for.

   The following Unit Prices are required where applicable to particular Base Bid and/or Alternates being submitted.

   Only a single Unit Price shall be given and it shall apply for either MORE or LESS work than that shown on the Drawings or called for in the Specifications as indicated to be included in the Base Bid and/or Alternates. In the event that more or less units than so indicated are actually furnished, Change Orders will be issued for the increased or decreased amount as approved by the Architect and CM.

   The Bidder understands that the Owner and CM will not be liable for any Unit Price or any amount in excess of the Base Bid and any Alternate(s) accepted at time of award of contract, except as expressed in written Change Orders duly executed and delivered by the Owner and CM.

2. PROJECT COMPLETION:

   Commencement: Subcontractor agrees to commence work on this project as directed by the CM with-in 48 hours of Notice or as the Project Schedule dictates.

   Lowest and Best Bid: The Subcontractor acknowledges time is of the essence for this project. The Subcontractor acknowledges and agrees that the Owner and CM reserves the option of selecting the Subcontractor based on the **Lowest and Best Responsible Bid**. The Bidder agrees to hold the Owner, Architect and CM harmless and will make no claim against the Architect, Owner or CM for awarding a Lowest Responsible Bid. Refer to Sect. 00 21 13 Instructions to Bidders, for clarification of issues the Owner and CM may choose to consider in determining lowest responsible bid.

3. BIDDER'S ACKNOWLEDGMENTS:

   The Bidder declares that he has had an opportunity to examine the site of the work and

he has examined the Contract Documents therefore; that he has carefully prepared his Bid upon the basis thereof, that he has carefully examined and checked this Bid and the materials, equipment, and labor required thereunder, the cost thereof, and his figures therefor, and hereby states that the amount, or amounts, set forth in this Bid is, or are, correct and that no mistake or error has occurred in this Bid or in the Bidder's computations upon which this Bid is based, and the Bidder agrees that he will make no claim for reformation, modifications, revisions, or correction of this Bid after the scheduled closing time for the receipt of Bids.

In submitting this Bid, it is agreed that it may not be withdrawn for a period of forty five (45) days after the scheduled closing time for receipt of Bids.

The Bidder understands that the Owner and CM reserves the right to award the contract to the lowest and best responsible bidder and to reject any or all bids and / or to waive any technicalities or informalities in the bidding.

4. BIDDER'S CERTIFICATE:

The Bidder hereby certifies:

a) That his bid is genuine and is not made in the interest of, or on behalf of any undisclosed person, firm, or corporation, and is not submitted in conformity with any agreement or rules of any group, association or corporation.

b) That he has not directly or indirectly induced or solicited any other bidder to; a) put in a false or sham bid, or b) not provide their supplier, manufacturer or subcontractors bids to the CM.

c) That he has not solicited or induced any person, firm or corporation to refrain from bidding.

d) That he has not sought by collusion or otherwise to obtain for himself any advantage over any other Bidder or over the Owner or CM.

e) That he will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin in connection with the performance of the work.

h) That he is familiar with the requirements for primary responsibility to coordinate the work and will comply with the conditions of the contract and cooperate with the Architect and CM in fulfilling his administration responsibilities to the contract.

i) That he will comply with requirements for the Project Schedule and that schedule will become one of the communication devices for communicating project progress to the Architect, Owner and CM.

j) That Lowest and Best Responsible Bid will prevail over Lowest Bid.

k) That this is NOT a Prevailing Wage Project.

l) That this project DOES NOT qualify for Tax Exempt Status and the bid reflects inclusion of all required state, local and federal taxes.

END OF BID FORM SECTION 00 41 00

SECTION 00 51 00 - PREVAILING WAGE ORDER

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

Annual Wage Order No. 28
Section 055
Lawrence County

Filed with Secretary of State: March 10, 2021

See following pages for Wage Order No. 28

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MICHAEL L. PARSON, Governor

Annual Wage Order No. 28

Section 055
LAWRENCE COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Taylor Burks, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2021**

Last Date Objections May Be Filed: **April 8, 2021**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$24.15
Boilermaker	*$21.83
Bricklayer	*$21.83
Carpenter	$45.31
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	*$21.83
Plasterer	
Communications Technician	*$21.83
Electrician (Inside Wireman)	*$21.83
Electrician Outside Lineman	*$21.83
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	*$21.83
Glazier	*$21.83
Ironworker	*$21.83
Laborer	$36.94
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	*$21.83
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	*$21.83
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	*$21.83
Plumber	*$21.83
Pipe Fitter	
Roofer	*$21.83
Sheet Metal Worker	*$21.83
Sprinkler Fitter	*$21.83
Truck Driver	*$21.83
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

*The Division of Labor Standards received less than 1,000 reportable hours for this occupational title.
Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.
**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

Heavy Construction Rates for
LAWRENCE County

Section 055

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	*$21.83
Millwright	
Pile Driver	
Electrician (Outside Lineman)	*$21.83
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	$40.81
General Laborer	
Skilled Laborer	
Operating Engineer	*$21.83
Group I	
Group II	
Group III	
Group IV	
Truck Driver	*$21.83
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received less than 1,000 reportable hours for this occupational title.
Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

END SECTION 00 51 00

SECTION 00 96 00 AFFIDAVITS

Included in this Section:

1) **Affidavits**:

a) Vendor No Tax Due

b) OSHA 10 Hour Construction Training

c) E-Verify

2) **FORMS:**

a) MO Prevailing Wage Reporting Form/Contractor Payroll Record (LS-57 AI). This form is included here for reference only and ALL Subcontractors shall download and fill out or print directly from the State of MO website at:
https://labor.mo.gov/sites/labor/files/pubs_forms/LS-57-AI.pdf

TO BE CONSIDERED A QUALIFIED SUBCONTRACTOR THE 3 AFFIDAVITS LISTED ABOVE MUST BE IN-PLACE WITH THE BIDDING SUBCONTRACTOR.

Completed Affidavits shall not accompany the bid. COMPLETED Affidavit and proof of No Tax Due and being enrolled in an E-Verify Program shall be provided to the CM's Project Manager before Subcontract Agreements/Contracts will be executed.

RE Smith Construction Company

Barry-Lawrence Regional Library:

MONETT BRANCH LIBRARY

VENDOR NO TAX DUE

In accordance with Section 34.040.6 RSMO, BLRL Regional Library in Lawrence County Missouri is precluded from contracting with a vendor or its affiliate who makes sales at retail of tangible personal property or for the purpose of storage, use or consumption in this state but fails to collect and properly pay the tax as provided in RSMO 144.

In order for RE Smith Construction and the BLRL Regional Library to be able to consider your response to your proposal provided for the project described in the header of this page above, you must verify that you are either registered to collect sales and/or use tax in Missouri, or you are not making retail sales of tangible personal property or providing taxable services in Missouri. You can provide this verification by submitting an official "Vendor No Tax Due" certificate issued by the Missouri Department of Revenue. The Department of Revenue will issue the "Vendor No Tax Due" certificate if you are properly registered to collect and have properly remitted sales and/or use tax, or if you are not making retail sales in Missouri. Once the "Vendor No Tax Due" certificate is issued, submit it NO LATER THAN bid due date and to the address noted below.

If you do not provide the "Vendor No Tax Due" certificate by the date specified above and/or maintain a compliant tax status, it may render your bid unacceptable for further consideration.

You may obtain a "Vendor No Tax Due" certificate by contacting the Missouri Department of Revenue. The attached document provides information on how to obtain the "Vendor No Tax Due" certificate. Additional information regarding Section 34.040.6 RSMO is available on the Department of Revenue's website at http://www.dor.mo.gov/tax/business/sales/hb600.htm.

If you are not already registered as a vendor with the State of Missouri, you are encouraged to register on the state's On-Line Bidding/Vendor Registration System website (https:www.moolb.mo.gov). Instructions for registering on this website are available on the Home page of the website.

Thank you for your attention to this urgent matter.

See Next Page……..

RE Smith Construction Company

Barry-Lawrence Regional Library:
MONETT BRANCH LIBRARY

How to Obtain A Certificate Of Vendor No Tax Due

A certificate of vendor no tax due can be obtained from the Missouri Department of Revenue when a business pays all of its sales/use tax in full, up to date, does not have a sales tax delinquency or does not sell tangible personal property at retail in Missouri.

If taxes are due, depending on the payment history of the business, a cashier's check or money order may be required for payment before a certificate of vendor no tax due can be issued.

A certificate of vendor no tax due can be obtained by contacting the Missouri Department of Revenue, Division of Taxation & Collection, P.O. Box 3666, Jefferson City, MO 65105-3666. You may also call (573) 751-9268, fax (573) 522-1160, or email taxclearance@dor.mo.gov, or complete and fax the Request For Tax Clearance, Form 943, located at http://dor.mo.gov/tax/misc/forms/943f.pdf. If you elect to complete the Request for Tax Clearance, Form 943, make sure you check item 4 in the Reason For Request section. For walk-in assistance, you can visit a Tax Assistance Center near you:

Jefferson City
301 West High Street, Room 330

St. Louis
3256 Laclede Station Rd., Ste 101

Kansas City
615 E 13th St., Room 127

Columbia
1500 Vandiver Drive, Room 113

Cape Girardeau
3102 Blattner Dr., Suite 102

St. Joseph
525 Jules, Room 314

Springfield
149 Park Central Square, Room 313

Joplin
705 Illinois Avenue, Suite 4

Affidavit of Compliance with Section 292.675 R.S.Mo., Et Seq.
OSHA 10hr Construction Training

Barry-Lawrence Regional Library:
Monett Branch Library

STATE OF _____)
) ss.
COUNTY OF _____)

Before me, the undersigned Notary Public, in and for the County of _____,

State of _____, personally appeared _____

(Name) who is _____ (Title) of _____
(Name of company), (a corporation), (a partnership), (a sole proprietorship), (a limited liability company), and is competent and authorized to make this affidavit, and being duly sworn upon oath deposes and says as follows:

1. that said company has verified the completion of a 10-hour construction safety program with respect to the employees working in connection with the contracted services.

The terms used in this affidavit shall have the meaning set forth in Sections 292.675 R.S.Mo., et seq.

_____

Signature

Name: _____

Subscribed and sworn to before me this _____ day of _____, _____.

_____

Notary Public

My commission expires: _____

RE Smith Construction Company

Barry-Lawrence Regional Library:

MONETT BRANCH LIBRARY

BUSINESS ENTITY CERTIFICATION, ENROLLMENT DOCUMENTATION,

AND AFFIDAVIT OF WORK AUTHORIZATION BUSINESS ENTITY CERTIFICATION:

The bidder/contractor must certify their current business status by completing either Box A or Box B or Box C on this Exhibit.

BOX A:	To be completed by a non-business entity as defined below.
BOX B:	To be completed by a business entity who has not yet completed and submitted documentation pertaining to the federal work authorization program as described at http://www.dhs.gov/files/programs/gc_1185221678150.shtm.
BOX C:	To be completed by a business entity who has current work authorization documentation on file with a Missouri state agency including Division of Purchasing and Materials Management.

Business entity, as defined in section 285.525, RSMo, pertaining to section 285.530, RSMo, is any person or group of persons performing or engaging in any activity, enterprise, profession, or occupation for gain, benefit, advantage, or livelihood. The term "**business entity**" shall include but not be limited to self-employed individuals, partnerships, corporations, contractors, and subcontractors. The term "**business entity**" shall include any business entity that possesses a business permit, license, or tax certificate issued by the state, any business entity that is exempt by law from obtaining such a business permit, and any business entity that is operating unlawfully without such a business permit. The term "**business entity**" shall not include a self-employed individual with no employees or entities utilizing the services of direct sellers as defined in subdivision (17) of subsection 12 of section 288.034, RSMo.

Note: Regarding governmental entities, business entity includes Missouri schools, Missouri universities (other than stated in Box C), out of state agencies, out of state schools, out of state universities, and political subdivisions. A business entity does not include Missouri state agencies and federal government entities.

RE Smith Construction Company

Barry-Lawrence Regional Library:

MONETT BRANCH LIBRARY

BOX A – CURRENTLY NOT A BUSINESS ENTITY

I certify that _____ (Company/Individual Name) **DOES NOT CURRENTLY MEET** the definition of a business entity, as defined in section 285.525, RSMo pertaining to section 285.530, RSMo as stated above, because: (check the applicable business status that applies below)

- ❒ I am a self-employed individual with no employees; **OR**
- ❒ The company that I represent employs the services of direct sellers as defined in subdivision (17) of subsection 12 of section 288.034, RSMo.

I certify that I am not an alien unlawfully present in the United States and if _____ (Company/Individual Name) is awarded a contract for the services requested herein under _____ (Bid/SFS/Contract Number) and if the business status changes during the life of the contract to become a business entity as defined in section 285.525, RSMo, pertaining to section 285.530, RSMo, then, prior to the performance of any services as a business entity, _____(Company/Individual Name) agrees to complete Box B, comply with the requirements stated in Box B and provide the _____(insert agency name) with all documentation required in Box B of this exhibit.

Authorized Representative's Name (Please Print)	Authorized Representative's Signature
Company Name (if applicable)	Date

EXHIBIT _, continued

(Complete the following if you DO NOT have the E-Verify documentation and a current Affidavit of Work Authorization already on file with the State of Missouri. If completing Box B, do not complete Box C.)

BOX B – CURRENT BUSINESS ENTITY STATUS

I certify that _____ (Business Entity Name) **MEETS** the definition of a business entity as defined in section 285.525, RSMo, pertaining to section 285.530.

Authorized Business Entity Representative's Name (Please Print)	Authorized Business Entity Representative's Signature
Business Entity Name	Date

E-Mail Address

E-Mail Address

E-Mail Address

E-Mail Address

EXHIBIT _, continued

AFFIDAVIT OF WORK AUTHORIZATION:

The bidder/contractor who meets the section 285.525, RSMo, definition of a business entity must complete and return the following Affidavit of Work Authorization.

Comes now _____ (Name of Business Entity Authorized Representative) as _____ (Position/Title) first being duly sworn on my oath, affirm _____ (Business Entity Name) is enrolled and will continue to participate in the E-Verify federal work authorization program with respect to employees hired after enrollment in the program who are proposed to work in connection with the services related to contract(s) with the State of Missouri for the duration of the contract(s), if awarded in accordance with subsection 2 of section 285.530, RSMo. I also affirm that _____ (Business Entity Name) does not and will not knowingly employ a person who is an unauthorized alien in connection with the contracted services provided under the contract(s) for the duration of the contract(s), if awarded.

In Affirmation thereof, the facts stated above are true and correct. (The undersigned understands that false statements made in this filing are subject to the penalties provided under section 575.040, RSMo.)

Authorized Representative's Signature	Printed Name
Title	Date
E-Mail Address	E-Verify Company ID Number

Subscribed and sworn to before me this _____ of _____. I am
(DAY) (MONTH, YEAR)

commissioned as a notary public within the County of _____, State of
(NAME OF COUNTY)

_____, and my commission expires on _____.
(NAME OF STATE) (DATE)

Signature of Notary	*Date*

DIVISION OF LABOR STANDARDS

MISSOURI DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

CONTRACTOR PAYROLL RECORDS

(See Sections 290.210 to 290.340, RSMo and 8 CSR 30-3.010 to 8 CSR 30-3.060)

Name of ☐ Contractor ☐ Subcontractor	Address of Contractor or Subcontractor: City: State: ZIP: Phone Number: ( ) -
Name of Public Body	Address of Public Body: City: State: ZIP: Phone Number: ( ) -

Payroll No.	For Week Ending	AWO	Project and Location	Project or Contract No.
	/ /			

1. Name and Address of Employee	2. Occupational Title ***	3. Day and Date								4. Total Hours	5. Hourly Rate	6. Gross Amt	7. Deductions					8. Net Wages Paid for Week
		Day										Project / Week	FICA and Medicare	Federal and State Withholding Tax	Other A	Other B	Total Deductions	
		Date																
		Hours Worked Each Day																
		DT								0								
		OT								0							0	
		ST								0								
		DT								0								
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****** If a worker performs work in more than one occupational title, you must separately list the hours worked per occupational title and wage rates. ******

FRINGE BENEFITS

In addition to the basic rates paid to each laborer or mechanic on the payroll, payments have been or will be made to appropriate programs for the benefit of these employees as shown in the following chart below. If fringe benefit amounts paid are the same for all employees, you may list the amount of each such identical fringe payment only once in the appropriate column; if the fringe benefit amounts vary by employee, list each employee's name and set out the amounts paid on behalf of each employee for each fringe benefit.

Employee Name	Health and Welfare ($/hr)	Pension ($/hr)	Vacation ($/hr)	Holiday ($/hr)	Appren-tice Training ($/hr)	Other C ($/hr)	Other D ($/hr)	Total ($/hr)	If "Other/Deduction" or Fringes, please explain. (Indicate Other A, B, C or D)	Identify by name, the plan, fund, or programs to which fringe benefits are paid. (Indicate H&W, Pension, etc.)
								0		
								0		
								0		
								0		
								0		
								0		
								0		
								0		

Date: _____

I, _____ *(Name of Signatory Party)*, _____ *(Title)* do hereby state:

(1) That I pay or supervise the payment of the persons employed by _____ *(Contractor or Subcontractor)* on the _____ *(Building or Work)*; that during the payroll period commencing seven (7) days prior to the week ending date of _____ all persons employed on said project have been paid the full weekly wages stated above, that no rebates have been or will be made either directly or indirectly to or on behalf of _____ *(Contractor or Subcontractor),* from the full weekly wages earned by any person and that no deductions have been made

either directly or indirectly from the full wages earned by any person, other than legally permissible deductions, that full and accurate records clearly indicating the names, occupations, and crafts of every worker employed by them in connection with the public work together with an accurate record of the number of hours worked by each worker and the actual wages paid for each class or type of work performed and deduction made for each worker have been prepared, that these payroll records are kept and have been provided for inspection to the authorized representative of the contracting public body and will be available as often as may be necessary and such records shall not be destroyed or removed from the state for the period of one year following the completion of the public work in connection with which the records are made.

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage order incorporated into the contract; that the occupational title set forth herein for each laborer or mechanic conform with the work performed.

Name and Title	Signature
The falsification of any of the above statements may subject the contractor or subcontractor to criminal prosecution. See Sections 290.340, 570.090, 575.050, and 575.060, RSMo.	

SECTION 01 01 00 - SUMMARY OF THE WORK

RELATED DOCUMENTS

Drawings and general provisions of Contract including General and Supplementary General Conditions and other Division 1 Specification Sections apply to this Section. This section is intended to assist the bidder, when selected, in understanding the scope of work intended in the documents. Work described herein is for orientation; refer to the Documents for the specific scope of work.

PROJECT DESCRIPTION-GENERAL

The CM is soliciting bids for the project, Barry-Lawrence Regional Library: MONETT BRANCH LIBRARY through multiple bid packages from subcontractors. Refer to the documents for the Work and condition requirements. Refer to bid packages in the Scopes of Work Section 00 20 00.

The Project Site is located at 2200 Park Street, Monett, MO 65708, at the corner of Park Street and Old Airport Road in the city of Monett, the state of MO and the county of Lawrence.

The Project consists of Construction of a new 22,000 sqft facility for the Barry-Lawrence Regional Library. It includes, but not limited to; Sitework, Site Utilities, Site Concrete and Asphalt, Concrete Building Foundation Systems, Masonry, Misc. and Structural Steel, Rough Carpentry, Millwork, Standing Seam Roofing and Metal Wall Panels, Hollow Metal and Wood Doors, Aluminum Framed Entrances and Windows, Finish Hardware, Metal Stud Framing, Gypsum Board, Acoustical Ceilings, Tile, Resilient Flooring, Painting, Fire Sprinkler, Plumbing, HVAC, Electrical and Special Systems.

ACCESSIBILITY STANDARDS AND PROVISIONS FOR THE HANDICAPPED: The project is to comply with the following standards: IBC 2018
American National Standard ICC/ANSI 117/1-2003
Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines 2010 ED. It is a part of this project. (ADAAG)

The designers have endeavored to comply with these standards as the project design has developed. It is required of this contract that the Contractor and those trades involved in the execution of the work, and tradesmen familiar with the detail requirements of accessibility, notify the architect of deficiencies, or non compliance should they become aware of the inconsistency.

Nothing in this requirement is intended to extend design responsibility to the constructors and requirement of the Conditions of the contract. Designers are making every effort to have a compliant accessible facility and seek your review and input in achieving it.

Partial owner Occupancy: The Owner reserves the right to limited occupancy during construction. Limited occupancy is directed toward placing and installing Furnishings, Fixtures,

and equipment in areas of the building (s), provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of Work. The contractor shall as a part of his work provides coordination and scheduling to allow the owners work, or work by separate contractors of the owner, and staff, to be done.

ALTERNATES

1) VALUE ENGINEERING
2) VALUE ENGINEERING

END OF SECTION 01 01 00

SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to this section.

1.2 SUMMARY

A. This section specifies administrative and procedural requirements for handling and processing Contract modifications.
   1. Division 1 Section "Unit Prices" for administrative requirements governing use of unit prices.
   2. Division 1 Section "Application for Payment" for administrative procedures governing applications for payment.
   3. Division 1 Section "Product Substitutions" for administrative procedures for handling requests for substitutions made after award of the Contract.

1.3 **CHANGES IN THE WORK**

A. **Supplemental instruction (SI)** authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Architect on AIA form G710, Architect's Supplemental Instructions. The Supplemental Instruction (**SI**) is also used as a tool for summarizing actions. If a Subcontractor expects a cost for the work of the SI, then they will provide a COR per item B.1. below.

B. **Proposal Request (PR)**

1.Both the Architect and the CM may initiate and issue a **PR** (Proposal Request). The subcontractor will respond no later than 96 hours after PR is released, if a claim is anticipated, as a **COR** (Change Order Request). The COR will include a suggested project cost (addition or deduction) and suggested time increase or decrease. If no claim is to be made for time or monies the issue will then be de-elevated to an SI. **To allow work to proceed timely between Change Order Approvals which are done at least monthly, an email or other written communication or a COR signed by the CM or Architect or Owners Representative will allow work to proceed with the recognition that the formal Change Order with incorporate that COR into the work. All DIRECTION of approval will come from the CM to the Subcontractor.**

2. Owner Initiated Proposal Requests: (PR) Proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time will be issued by the Architect, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications. Change Orders are to be kept up to date and current, to allow the CM and Owner to monitor the project budget.

3. Proposal requests issued by the Architect are for information only. Do not consider them an instruction either to stop work in progress, or to execute the proposed change.
4. Unless otherwise indicated in the proposal request, within 7 days of receipt of the proposal request, submit to the Architect for the Owner's review an estimate of cost necessary to execute the proposed change.
   a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
   b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

C. **CM or Subcontractor-Initiated Change Order Requests**: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
1. Include a statement outlining the reasons for the change and the effect of the change on the Work within 10 days of occurrence of cause for change. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Comply with requirements in Section "Product Substitutions" if the proposed change in the Work requires the substitution of one product or system for a product or system specified.

1.4 UNIT COST ALLOWANCES (If required)

A. Allowance Adjustment: Base each Change Order Request for an allowance cost adjustment solely on the difference between the actual purchase amount and the unit cost allowance, multiplied by the final measurement of work-in-place, with reasonable allowances, where applicable, for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
1. Submit substantiation of a change in scope of work claimed in the Change Order Request related to unit-cost allowances.
2. The Owner reserves the right to verify and modify the actual quantity of work-in-place by independent quantity survey, measure, or count.

B. Claims must be submitted for increased costs within 10 days of the occurrence.

1.5 CONSTRUCTION CHANGE DIRECTIVE (Force Account)

A. Construction Change Directive **(CCD)**: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the contractor may be required to proceed with the work through the CCD Process. the Architect may issue a Construction Change Directive on AIA Form G714, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. **Terms will be based on time and material with allowed mark-up**. Work will be monitored by a designate of the Owner's representative.
1. The Construction Change Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the

Contract Sum or Contract Time.

2. Requirements listed below for Change Orders apply to Construction Change Directives in determining changes to the Contract Sum or Time.

3. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
4. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
5. Ultimately the CCD becomes a Change Order.

1.6 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Change Order Request**, the CM** will issue a **Change Order** for signatures of the Owner and Architect on form similar to the AIA Form G701, as provided in the Conditions of the Contract. Changes to the work shall be kept current on a monthly basis.
To allow for timely decisions affecting work, the COR's are typically processed in weekly intervals as needed to keep the work flowing smoothly.

B. Submit a complete itemized list of all material and labor in each proposal for change items as shown by example of attached sample itemized proposal.

C. Deductive Change Orders shall include costs of the work plus percentages for contractor mark up to be deducted.

D. Pre-approval of a COR: To accelerate decision making and assure the project proceeds in a timely manor, the Owner may entertain pre approving a Change Order Request. This is essentially a statement by the Owner that a Change Order will be accepted when processed in the future. The approved COR must be signed by the Contractor, Architect, and Owner to become an approved document.

1.7 MAXIMUM ALLOWANCE FOR OVERHEAD AND PROFIT & LABOR BURDEN on Change Orders: (THE CMs OHD and PROFIT shall be per their agreement with the Owner).

A. Labor costs per hour shall be included with labor burden identified, which shall not be less than actual labor rate. Identify any labor burden costs over and above the prevailing wage rate. Labor burden costs shall not include overhead and profit charges as identified below.

B. The overhead and profit charge by the Contractor and all subcontractors shall be considered to include, but is not limited to: job site office expense, incidental job burdens, truck expense including mileage, small hand tools, project supervision including field supervision, company benefits and general office overhead. Percentages for overhead and profit charged for Change Orders shall be negotiable and may vary according to the nature, extent and complexity of the work involved. Percentage mark ups provided herein are intended to include the costs associated with all delay, disruption, extended job site presence and home office overhead resulting from the changed work.

C. **The maximum allowable Overhead and Profit is a condition of the Contract and shall be as follows**:

	Not to Exceed
A. To Subcontractor for work performed by his own forces	10%

B. To Subcontractor for work performed by other than his own forces 5%

C. To Subcontractor's Suppliers and Lower Tier Subcontractors for work performed or provided to the Subcontractor for this contract 10%

Percentages for overhead and profit will not be allowed on applicable taxes and bond Premiums. No Supervision or General Conditions or General Requirement costs will be allowed on any Change Orders or COR's unless approved by the CM.

E. On proposals covering both increases and decreases in the amount of this contract, the application of overhead and profit shall be on the net change in the cost of the work. Proposals must show items to be deleted, if any, and the cost of the change shall be the result of the net difference to the base contract. Proposals are **not** to be determined by a re-bid of the entire scope of work although the CM reserves the right to solicit pricing from other Subcontractors when the Subcontractor does not provide pricing per the contract documents or where changes significantly alter the entire scope of a particular bid package. Significant change is defined as altering more than 25% of the bid packages scope or contract amount.

F. Change Orders shall be kept current within the month of the incident leading to the claim and may only be billed once approved Change Orders have been executed or the CM's Project Manager makes special approval for billings.

1.8 Submit a complete itemized list of all material and labor in each proposal for change items as shown by example of attached sample itemized proposal.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

PART 4 - SAMPLE SHEET (ATTACHED).

PART 4 - SAMPLE

SAMPLE PRICING SHEET

Project: Sprinkler Modification for XYZ Company
Location: Chicken Butt, Missouri Date: February 27, 2020
Labor Rate: $27.00 Estimator: Joe Smith

Material	Units	Unit Measure	Material Per Unit	Man Hours Per Unit	Total Man Hrs.	Material Total
6" Tee	1	each	$45.00	2.000	2.0	$ 45.00
less 6" ell	1	each	$30.00	0.000	0.0	30.00
6" sch 40 pipe	15	feet	$10.43	0.253	3.8	156.45
6" cap	1	each	$11.00	1.500	1.5	11.00
6" hanger	1	each	$12.00	0.400	0.4	12.00
4" saddle weld	1	each	$ 0.00	1.200	1.2	0.00
4" sch 40	18	feet	$ 4.44	0.183	3.3	79.92
4" ell	3	each	$13.39	2.000	6.0	40.17
4" hanger	3	each	$ 8.00	0.300	0.9	24.00
4" weld	1	each	$ 3.00	1.000		1.0 3.00
1-1/2" cond sch 80	21	feet	$ 1.63	0.080		1.7 34.23
1-1/2" ell	3	each	$ 4.00	0.400	1.2	12.00
1-1/2" tee	1	each	$ 5.00	0.600	0.6	5.00
1-1/2" weld	1	each	$ 3.00	0.400		0.4 7.20
3/4" tee	1	each	$ 1.50	0.300		0.3 1.50
3/4" ell	3	each	$ 0.95	0.200	0.6	2.85
3/4" hanger	2	each	$ 2.50	0.200		0.4 5.00
SUBTOTAL					28.4	$ 618.47
SALES TAX (if applicable)						6.125% 37.88
LABOR	28.4	MH				$27.00 765.96
SUBTOTAL						$1422.31
10% OVERHEAD AND PROFIT						142.23 142.23
TOTAL						$1,564.54

END OF SECTION 01 25 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes utilization of EITHER a web based platform: **Procore/Submittal Exchange or Electronic Mail (e-mail)** as the tool for administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
   1. Email Submittals – ONLY as directed by CM

ELECTRONIC SUBMITTAL PROCEDURES – Submittal Exchange/Procore

A. Summary:
   1. Shop drawing and product data submittals shall be transmitted via upload to CM in electronic (PDF) format using Submittal Exchange/Procore, a website service designed specifically for transmitting submittals between construction team members.
   2. The CM will review all submittals and re-upload for Architect/engineer Review
   3. It is the subcontractor's responsibility to track their own submittals. For example, if the Bid Package 03 Concrete Subcontractor submits the reinforcing shop drawings to the CM it is THE SUBCONTRACTOR'S DUTY to follow-up with the CM to make sure that the submittal was received and when it is expected to be completely reviewed. IT IS NOT THE CM'S RESPONSIBILITY TO follow-up with the Subcontractor and delay damages will be assessed to all Subcontractors who fail to provide submittals in ample enough time to have their products reviewed to be able to order and then install per the schedule.
   4. The Architect will then release the submittal marked as Reviewed, Reviewed with Notes, Revise and Re-Submit or Rejected (or similar verbiage)
   5. It is the subcontractors responsibility to monitor the website for activity.
      a. (E-mail invitation will be sent to each subcontractor by the CM after Award of Contract. Free Training is available through the web-based platform for all participants but must be set-up between the participant and the web-based platform service.)
   6. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.

7. The electronic submittal process is not intended for color samples, color charts, or physical material samples which will need to be MAILED to the CM for review prior to the CM transmitting to the Architect.

B. Procedures:
1. Submittal Preparation – CM(Contractor) may use any or all of the following options:
   a. Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor via the project website.
2. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements and intent of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
3. Contractor shall transmit each submittal using the project website. IF the project is set-up with this platform of deliverables.
4. Architect / Engineer review comments will be made available on the Submittal Exchange website for downloading. Subcontractor will receive email notice of completed review in most cases but it is the responsibility of the Subcontractor to monitor the project website for changes and new uploads.
5. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the CM and will be done electronically through Submittal Exchange/Procore.

6. The Contractor requires each subcontractor to submit **1 paper copy** of all reviewed submittals at project closeout for record purposes in accordance with Section 017700 – Closeout Submittals

ELECTRONIC SUBMITTAL PROCEDURES – Electronic Mail (e-mail)

A. Summary:
1. Shop drawing and product data submittals shall be transmitted via email to the CM in electronic (PDF) format.
1. The CM will review all submittals and transmit for Architect/engineer Review
2. The Architect will then transmit the submittal marked as Reviewed, Reviewed with Notes, Revise and Re-Submit or Rejected (or similar verbiage) via email back to the CM.
3. It is the subcontractor's responsibility to track their own submittals. For example, if the Bid Package 03 Concrete Subcontractor emails the reinforcing shop drawings to the CM it is THE SUBCONTRACTOR'S DUTY to follow-up with the CM to make sure that the submittal was received and when it is expected to be completely reviewed. IT IS NOT THE CM'S RESPONSIBILITY TO follow-up with the Subcontractor and delay damages will be assessed to all Subcontractor's who fail to provide submittals in ample enough time to have their products reviewed to be able to order and install per the schedule.

4. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
5. The electronic submittal process is not intended for color samples, color charts, or physical material samples which will need to be MAILED to the CM for review prior to the CM transmitting to the Architect.

B. Procedures:

1. Submittal Preparation – CM(Contractor) may use any or all of the following options:
   a. Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor via the Submittal Exchange/Procore website.
2. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements and intent of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
3. Contractor shall transmit each submittal using the Procore , www.procore.com or Submittal Exchange website, www.submittalexchange.com. IF the project is set-up with this platform of deliverables.
4. Architect / Engineer review comments will be made available on the Submittal Exchange website for downloading. Subcontractor will receive email notice of completed review in most cases but it is the responsibility of the Subcontractor to monitor the project website for changes and new uploads.
5. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the CM and will be done electronically through the project website.

6. The Contractor requires each subcontractor to submit **1 paper and 1 digital copy** of all reviewed submittals at project closeout for record purposes in accordance with Section 017700 – Closeout Submittals.

C. Costs:

Each Subcontractor must include in their proposal, an allowance amount of $500.00 (five hundred dollars) for their company's use of Submittal Exchange/Procore/Project Website services. Before Substantial Completion, this allowance amount will be transmitted to the CM by the Subcontractor in the form of a deductive change order.

D. Internet Service and Equipment Requirements:

a. Email address and Internet access at Subcontractor's main office or readily available device with the ability to accept, send and view websites and email.
b. Adobe Acrobat (www.adobe.com)

c. Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires CM or Architect's responsive action.

B. Informational Submittals: Written information that does not require CM, Architect's or Owner's Representative's approval. Submittals may be rejected for not complying with requirements or marked as Not Reviewed or similar.

1.4 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect and Engineer for Contractor's use in preparing submittals. Request documents through the CM.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities and the Project Schedule.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals, return, and re-edit submittals returned for modification, concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Section 00 20 00 Scopes of Work attachment of Submittal Schedule and Division 1 for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.

1. Initial Review: Allow 10 working days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Special Speed Submittal Processing: A special appeal in writing may be made by the CM to the Architect to expedite a submittal. (This is to speed the ordering or shop drawings process.) The Owner and Contractor agree hastened documents can

result in omission and errors. Consequently, each agrees to hold the A/E harmless for lapses and omissions that can occur as a result of accelerated reviews.

3. If intermediate submittal is necessary, process it in same manner as initial submittal.
4. Allow 10 working days for processing each resubmittal.
5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

E. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect and Owner's Representative.
3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of CM.
    e. Name and address of subcontractor.
    f. Number and title of appropriate Specification Section.
    g. Other necessary identification.

F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

G. Additional Copies:
1. When requested in writing by Owner, Architect, CM.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor. The Contractor must stamp submittals approved prior to review by the Architect.

I. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction. Refer to Submittal Log for determining Dates of the Final Submittal.

J. Verification of field conditions and measurements prior to fabrication and delivery: Actual condition field measurement prior to fabrication is the responsibility of the Contractor/sub-contractors. Do not rely on design documents as a resource for fabrication and installation. Field conditions change or often deviate from designed condition.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Submit to project website unless otherwise requested in writing.
2. Number of Copies: Submit copies of each submittal, as follows, unless otherwise indicated:

a. Sample Submittal: Submit 3-each submittal where selection of options, color, pattern, texture, or similar characteristics is required. Architect, through Owner's Representative, will return submittal with options selected.
b. Final Submittal: Submit one paper copy where required for All warranty, operation and maintenance information to the CM when requested. CM will transmit to Architect for Approval and upon that approval the Architect will transmit to Owner's Representative and he will retain the Manual.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's written recommendations.
b. Manufacturer's product specifications.
c. Manufacturer's installation instructions.
d. Standard color charts.
e. Manufacturer's catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Standard product operating and maintenance manuals.
j. Compliance with recognized trade association standards.
k. Compliance with recognized testing agency standards.
l. Application of testing agency labels and seals.
m. Notation of coordination requirements.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than **the bidding drawings size,** in pdf format uploaded to submittal exchange website in the proper section and item location

D. Coordination Drawings: Comply with requirements in Division 1 Section "Project Management and Coordination."

E. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Division 1 Section "Quality Requirements" for mockups.
2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:

a. Generic description of Sample.

b. Product name or name of manufacturer.
c. Sample source.

5. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:

   a. Size limitations.
   b. Compliance with recognized standards.
   c. Availability.
   d. Delivery time.

6. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.

   a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
   b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

7. Number of Samples for Initial Selection: Submit two (2) full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
8. Number of Samples for Verification: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.

   a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

9. Disposition: Maintain sets of approved Samples at Project site, or deliver to job site upon request for need by CM or Architect, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

F. Product Schedule or List: The CM has prepared a Submittal Schedule indicating Bid Package, Spec Section and types of products required. Retain first paragraph below for projects with a construction manager.

G. Schedule of Values: Comply with requirements in Division 1 Section "Payment Procedures."

H. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

B. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

H. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

I. Material Test Reports **(BY CM)**: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

J. Preconstruction Test Reports (BY OWNER): : Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.

K. Field Test Reports**(BY OWNER)**: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.

L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

M. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment.

N. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

O. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

P. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

Q. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

R. Material Safety Data Sheets: Submit information directly to Owner. If submitted to Architect, Architect will not review this information but will return it with no action taken.

PART 3 - EXECUTION

3.1 CONSTRUCTION MANAGER REVIEW

A. General: **CM will not review submittals that do not bear the Subcontractors approval stamp and may return them without action.** Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: **Architect will not review submittals that do not bear CM's approval stamp and may return them without action.**

B. Action Submittals: CM will submit to Architect and Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Approved as Submitted, Approved as Noted, Revise and Resubmit.

C. Informational Submittals: CM will review and submit to Architect who will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to Owner's Representative for distribution to appropriate party.

D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

3.3 ADDITONAL INFORMATION ON SUBMITTAL REQUIREMENTS:

1) Identify each document, shop drawing and material and equipment list, etc., similar to the following: Note: To assure adequate clarity to the project delivery process The CM and Architect reserves the right to require additional submittal data on a specification item without an increase in cost to the owner.

Example: When no spec section included use description = CIP Concrete Mix Design
When spec section provided = Section 05 10 00 Structural Steel Shop Drawings
Section 22 40 00 Plumbing Fixtures Product Data

Special Warranties, Certificates, and Operation and Maintenance Manuals – 1 Digital and 1 Paper copy shall be submitted to the CM before final payment will be made

END OF SECTION 01 33 00

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. References and standards.
B. Testing and inspection agencies and services.
C. Control of installation.
D. Mock-ups.
E. Tolerances.
F. Manufacturers' field services.
G. Defect Assessment.

1.2 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
C. Obtain copies of standards where required by product specification sections.
D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.3 Testing and Inspection Agencies and Services

A. Owner will employ and pay for services of an independent testing agency to perform specified testing and inspections.
B. Employment of agency in no way relieves CMr of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
B. Comply with manufacturers' instructions, including each step in sequence.
C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Have work performed by persons qualified to produce required and specified quality.
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-

up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

D. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.

E. Accepted mock-ups shall be a comparison standard for the remaining Work.

F. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.3 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.4 TESTING AND INSPECTION

A. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of CMr.
   4. Agency has no authority to stop the Work.

B. CMr Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by CMr beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by CMr beyond specified requirements.

C. Re-testing required because of non-compliance with specified requirements shall be paid for by CMr.

3.5 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.6 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

SECTION 01 51 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:
1. Water service and distribution.
2. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
3. Electric power service.
4. Lighting.
5. Heat/cooling and temporary environmental conditions
6. Telephone service.

C. Support facilities include, but are not limited to, the following:
1. Project identification and temporary signs.
2. Field offices.
3. Protective barriers and security
4. Fire protection
5. Temporary roads
6. Dewatering
7. Waste disposal (trash)
8. Storm-water, erosion control

D. Related documents include the following:
1. Conditions of the Contract.
2. Division 00, 01, 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
3. Divisions 2 through 33 for temporary heat, ventilation, and humidity control requirements for products in those Sections.

1.3 USE CHARGES

A. General: Use charges are the cost or use charges for temporary facilities which are not chargeable to Owner or Architect and shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

(THE OWNER WILL PAY FOR COST OF USAGE OF TEMPORARY ELECTRIC AND WATER) Overuse or Excessive use of owner provided utilities' will be grounds for termination of use and over-use will be charged!)

1. Owner's 3rd party construction forces.
2. Occupants of Project./ CM and CM Forces, Contractor and contractor forces.
3. Architect.
4. Testing agencies.

B. Water Service: The Bid Package 22 Subcontractor is required to provide a temporary yard hydrant at a location close to the building pad as required and at a precise location as directed by the CM for use by all entities engaged in construction activities at the project site. Until such time as the CM directs the BP 22 Subcontractor to install said temp yard hydrant, all Subcontractors shall provide for their own water source (both potable and non-potable) as required to complete their scope of work.

C. Telecommunication Services: Each subcontractor is responsible for their own telecommunication services. Every subcontractor will provide the CM with a list of names, job title, email address and phone numbers for all employees responsible for their scope of work and the respective duties of each employee. The CM will not provide phone, internet or fax services to any Subcontractor but will provide the service to Subcontractors for a charge of $150.00/month for internet services. The CM will provide internet services for the CM's on-site team and the Architect and Owner are allowed to utilize the CM's telecommunication while on site with the assistance of the CM.

D. Electric Power Service The Bid Package 26 Subcontractor shall hook-up the CM's Construction Trailers and make arrangements for temporary power as required for construction of the project. The OWNER shall pay for electric power service use, for electricity used by all entities engaged in construction activities at Project site.

E. Propane gas used for testing, start ups, construction related heating and space conditioning prior to final completion shall be provided for by the Bid Package 23 Subcontractor as required.

F. Sewer: The CM has made arrangements for temporary sanitation facilities for the entire construction period. The permanent toilet facilities WILL NOT be permitted for use.

1.4 QUALITY ASSURANCE

A. Regulations/Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.
   1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
   2. Electric Service: Comply with
   AHJ Requirements and NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
   3. Building Code Regulations
   4. Health & Safety Regulations
   5. Utility Company Regulations
   6. Police, Fire Department & Rescue Squad Rules
   7. Environmental Protection Regulations

B. Tests and Inspections: Subcontractors shall Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Notify the CM's Site Superintendent as well at least 24 hours in advance , but it is ultimately on the Subcontractor to notify all entities and ensure test is performed.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent/ existing Facilities: Subcontractor/Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
1. Keep temporary services and facilities clean and neat.
2. Relocate temporary services and facilities as required by progress of the Work.
3. Coordinate all work with owners field representative, as required, prior to taking action.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended. If Specification Sections in paragraph below are not included in Project, add requirements here.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Offices: As Approved by the CM. Power consumption is to be metered an made payable back to Owner

C. Self-Contained Toilet Units/Project Dumpsters: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material. The CM will provide Project Dumpsters for Construction Debris. Overuse or use not as intended on toilet units or dumpsters will result in the damaging subcontractor's company being charged 30 days worth of use and repair or replacement of the unit(s) if damaged or defaced.

D. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

E. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

F. First Aid Supplies: Comply with governing regulations. Bid Package 26 Subcontractor to discuss requirements of E. and F. in correlation with their Bid package requirements prior to commencing. All Subcontractors shall include this requirement for their scope of work. The CM's First Aid Supplies will not be used for or by any Subcontractors except in extreme cases.

G. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
   1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure. Each Subcontractor shall be required to provide as their work commences in accordance with the above standards and CM Safety policies . Hot Work permits are to be issued by CM where/when required as requested by the Subcontractor at least 48 hours in advance of the work commencing.

H. Cell Phones/Phone Numbers: Each subcontractor company is required to provide at minimum to their Job Foreman/Site Superintendent a cell phone with answering machine/voice mail set-up and all pertinent phone numbers of the Foreman and Project manager of the Subcontractor Company are to be given to CM as requested/needed.

I. Drinking Water/Waste Cans: It is the responsibility of each Subcontractor Company to provide drinking water in adequate supply to all of its employees while working on this project. It is the responsibility of each Subcontractor Company to provide Waste Cans of adequate number and size to provide for disposal of their waste on an hourly basis. This includes providing rolling dump carts to its employees to provide for the safe removal or trash, refuse, debris out of the building to the project dumpster.

J. CM will Provide a min. of five (5) hard hats, high reflectivity vests and goggles/safety glasses to be made available to the Architect and visitors on the site during the construction period.

K. Storage/Fabrication: It is the responsibility of each subcontractor to: a) provide for their own safe storage of combustibles while on site and if adequate storage space is not available on site the Subcontractor shall provide for the daily delivery and removal of combustibles. b) provide and remove all fabrication equipment and refuse from the fabrication process completed on site to offsite locations and make the area to be like new or as it was prior to the fabrication work.

L. **Subcontractors who forget proper PPE will be required to either purchase proper PPE from the CM or leave the project site and return with proper PPE before starting work/being allowed onto the jobsite.**

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Facilities will be located where they will serve Project adequately and result in minimum interference with performance of the Work.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Subcontractors will Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
   1. Arrange with utility company, and Owner for time when service can be interrupted, if necessary, to make connections for temporary services.
   2. Provide adequate capacity at each stage of construction. Before temporary utility is available, ALL Bid Package Subcontractors shall provide trucked-in or temporary services of utilities as required for the work with-in their scopes of work. Example, water truck as required for masonry work. Generator as required for electrical power consumption.
   3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

B. Sanitary Facilities: CM will Provide temporary toilets, and drinking-water. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
   3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled.
      a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
   4. Drinking-Water Facilities: Provide Drinking water.

C. Electric Power Service: BP 26 Subcontractor shall Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.
   1. Install electric power service underground, unless overhead service must be used.
   2. Install power distribution wiring overhead and rise vertically where least exposed to damage.
   3. Connect temporary service to Owner's existing power source, as directed by electric company officials.

D. Electric Distribution: BP 26 Subcontractor shall Provide receptacle outlets adequate for connection of power tools and equipment.
   1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
   2. Provide warning signs at power outlets other than 110 to 120 V.
   3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
   4. Provide metal conduit enclosures or boxes for wiring devices.

5. Provide 4-gang outlets, spaced so **100-foot** extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.

E. Lighting: BP 26 Subcontractor shall Provide temporary lighting with local switching that provides adequate illumination for construction operations and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install exterior-yard site lighting that will provide adequate illumination for construction operations, traffic conditions, and signage visibility when the Work is being performed.

F. Heating and Cooling: BP 23 Subcontractor shall Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed.
1. Maintain a minimum temperature of **50 deg F** in permanently enclosed portions of building for normal construction activities, and **65 deg F** for finishing activities and areas where finished Work has been installed.
2. Use of facility environmental systems prior to substantial completion: The contractor may utilitize facility HVAC systems for temporary construction. The HVAC subcontractor shall replace filters timely, maintain a log of filter replacement. Clean systems as required and provide new filters at the time of substantial completion and maintain the original manufacturers warranty.

G. Ventilation and Humidity Control: BP 23 Subcontractor shall Provide temporary ventilation/humidity control as required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation/humidity requirements to produce ambient condition required and minimize energy consumption.

***BP 22 , 23 and 26 Subcontractors are directed to coordinate with the CM for all temporary facility information in this section compared to that in the Bid packages/scopes of Work prior to commencing. ***

H. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas or areas in use or being worked in by trades of which these items will adversely affect. The work outlined below is to be completed by the Subcontractor who is doing the work affecting others and any items installed under this part are to be removed by the Sub that installed.
1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

I. Temporary Roads and Paved Areas: WHEN INCLUDED IN THE BID PACAKGES , Subcontractor shall Construct and maintain temporary roads and paved areas adequate to support loads and to withstand exposure to traffic during construction period. The plans will Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations. The contractor shall take special care to assure off site clutter or mudding of streets is avoided. Comply with jurisdictional requirements for maintenance of streets and entrances.
1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare sub-grade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earthwork."
3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Hot-Mix Asphalt Paving."

J. Temporary Use of Permanent Roads, Paved Areas and Temp Roads/Entrances: Protect existing paved areas, sidewalks and roads from damage from deliveries or any other construction activities. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
1. Cost of repairs of any existing areas damaged by the Subcontractor or any deliveries or other activities by anyone providing service to the Subcontractor shall be paid by the Subcontractor.

K. Traffic Controls: The CM will maintain traffic controls where required unless written to be provided in Subcontractor Bid Packages. NOTE: All earthwork and utility Subcontractors are to include correct and proper traffic control when doing work at, near or on City, County, State or Federal roads, streets and highways.

L. Parking: If able and included in the bidding documents, the CM will Provide temporary parking areas for construction personnel. Coordinate with Owner and other CM for use of existing parking areas or for designation of temporary parking areas. Maintain access for busses, staff, and public access. Restore any areas used for temporary parking to original condition upon completion of the work.

M. Dewatering Facilities and Drains: All Subcontractors as Required shall Comply with requirements in applicable Division 31 Sections or as required and needed for temporary drainage and dewatering facilities and operations not directly associated with construction activities included in individual Sections. Where feasible, use same facilities. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
2. Before connection and operation of permanent drainage piping system, provide temporary drainage where roofing or similar waterproof deck construction is completed.
3. Remove snow and ice as required to minimize accumulations.

N. Project Identification and Temporary Signs: BP 08A Subcontractor or the CM when General Trades is not part of the Bid Packages bidding, shall provide and install Project identification sign. This Subcontractor shall provide a temporary 8'x4' painted plywood construction sign identifying the project, the owner, the architect, the CM, and other items deemed appropriate by the Owner. The sign shall be placed in a prominent location near the entrance and maintained by the contractor for the duration of the project.

O. The BP 08A Sub or CM, when General Trades is not part of the Bid Packages bidding, shall Install other signs where required to inform public and persons seeking entrance to Project and required for management of visitors, the public, and students as a part of the Contractors Safety Plan. Do not permit installation of unauthorized signs.
   1. Prepare temporary signs to provide directional information to construction personnel and visitors.
   2. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.
   3. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.

P. Lifts and Hoists: All subcontractors shall provide facilities necessary for hoisting materials and personnel.
   1. Truck Cranes and similar devices used for hoisting materials are considered "tools and equipment" and are not temporary facilities.

Q. Temporary Stairs: Until such time as permanent stairs are available, when required, each subcontractor shall provide their own means of egrees/ingress to different levels of the project and site.

R. Waste Disposal Facilities: The CM will provide temporary dumpsters for construction and ALL SUBCONTRACTORS are to comply with:
   1. Containment of construction related waste, trash, containers, boxes, and other refuse is the responsibility of the Contractor. Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with but not only Division 1 Section "Execution Requirements" for progress cleaning requirements.
   2. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited. Retain paragraph above or paragraph and subparagraph below. Individual Project circumstances may require use of other construction aids and miscellaneous facilities, such as scaffolds, platforms, swing stages, ramps and bridges, incidental sheeting and shoring, and demolition waste chutes.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: All Subcontractors shall Provide as necessary protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near Project site.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, and authorities having jurisdiction, whichever is more stringent.
   1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
   2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
   3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
   4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

C. Storm water Control: BP 31 Subcontractor shall provide, maintain and comply with erosion control and sedimentation requirements for the site during construction.

D. Tree and Plant Protection: BP 31 Subcontractor shall Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. **Protect tree root systems from damage, flooding, and erosion.** Refer to Summary of the work for other requirements.

E. Pest Control: The CM shall Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials. If it is found that Subcontractors have not complied with other sections of the project documents that allowed for pests to enter the building, then the CM shall backcharge the offending sub the cost of required pest control. It is every Subcontractors responsibility to make sure that exterior doors and closures remain closed, and that their trash/refuse/debris is deposited correctly. This will negate the use of any pest control measures by the CM.

F. Site Enclosure Fence: BP 08A Subcontractor or the CM when General Trades is not part of the Bid Packages bidding, shall **Provide a Site Enclosure Fence as shown on the drawings. The plan will** Include a plan for construction personnel parking; staging and delivery of materials. Include temporary trailer parking for trades.
   1. Before construction operations begin, install chain-link or approved safe barrier/ enclosure fence with lockable entrance gates. Locate where indicated, or enclose entire Project site or portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs, and other animals from easily entering site except by entrance gates.
   2. Provide gates in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
   3. If necessary, provide a 2 gate system that is compatible with labor union requirements for shared operation..
   4. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

G. Security Enclosure and Lockup: BP 08A Subcontractor or CM when General Trades is not part of the Bid Packages bidding, shall furnish and Install substantial temporary enclosure around partially completed areas of construction as required. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

H. Barricades, Warning Signs, and Lights: BP 08A Subcontractor or the CM when General Trades is not part of the Bid Packages bidding, shall Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

I. Temporary Enclosures: BP 08A Subcontractoror the CM when General Trades is not part of the Bid Packages bidding, shall Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
   1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
   2. Vertical Openings: Close openings of **25 sq. ft.** or less with plywood or similar materials.
   3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
   4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.

J. Temporary Partitions (If required): BP 08A Subcontractor or the CM, when General Trades is not part of the Bid Packages bidding, shall Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
   1. Construct dustproof partitions of not less than nominal **4-inch** studs, **5/8-inch** gypsum wallboard with joints taped on occupied side
   2. Insulate partitions to provide noise protection to occupied areas.
   3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
   4. Protect air-handling equipment.
   5. Weather-strip openings.

K. Temporary Fire Protection: All Subcontractors shall Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities as directed by the CM of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
   1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
      a. Field Offices: Class A stored-pressure water-type extinguishers.
      b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
      c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
   2. Store combustible materials in containers in fire-safe locations.
   3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.
   4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
   5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

6. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
7. Provide hoses for fire protection of sufficient length to reach construction areas. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide incombustible construction for offices, shops, and sheds located within construction area or within **30 feet** of building lines. Comply with NFPA 241.
3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Project Identification and Temporary Signs: BP 08A Subcontractor or the CM when General Trades is not part of the Bid Packages bidding, shall furnish and install Project Signage as shown on plans. The sign will recognized the project, the owner, Architect, General contractor. Other signage is not permitted unless approved by the owner.

C. Common-Use Field Office: The CM will Provide an insulated, weather-tight, air-conditioned field office for their use only and it shall be kept clean and orderly and provide e-mail capability to be used by Owner and Architect and by permission only to Subcontractors.

3.5 MOISTURE AND MOLD CONTROL

A. Subcontractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction and replace any materials with mold visible.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Periodically collect and remove waste containing cellulose or other organic matter.
   4. Discard or replace water-damaged material.
   5. Do not install material that is wet.
   6. Discard, replace or clean stored or installed material that begins to grow mold.
   7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
   2. Use permanent HVAC system to control humidity.
   3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
      a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for **48** hours are considered defective.
      b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
      c. Remove materials that cannot be completely restored to their manufactured moisture level within **48** hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: The CM will Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses. Coordinate activities regarding temporary facilities with the owner's representative at each project meeting.

B. Maintenance: CM will Maintain their provided facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements as well as each Subcontractor maintaining their provided facilities per their Bid Packages/scopes of Work.
   1. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: CM will Remove or direct Subcontractors to remove their temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Re-use of existing products.
B. Transportation, handling, storage and protection.
C. Product option requirements.
D. Substitution limitations.
E. Maintenance materials, including extra materials, spare parts, tools, and software.

PART 2 PRODUCTS

2.1 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the CMr; remove from site.

2.2 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

2.3 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
D. Transport and handle products in accordance with manufacturer's instructions.
E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.2 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.
B. Store and protect products in accordance with manufacturers' instructions.
C. Store with seals and labels intact and legible.
D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
E. For exterior storage of fabricated products, place on sloped supports above ground.
F. Providebonded off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
H. Comply with manufacturer's warranty conditions, if any.
I. Do not store products directly on the ground.
J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
K. Prevent contact with material that may cause corrosion, discoloration, or staining.
L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 WASTE MANAGEMENT REQUIREMENTS

A. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

B. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

C. Regulatory Requirements: CMr is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.2 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

PART 2 PRODUCTS (UNUSED)

PART 3 EXECUTION (UNUSED)

END OF SECTION

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SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
   1. Inspection procedures, Substantial and Final Completion.
   2. Project record document submittal.
   3. Operating and maintenance manual submittal.
   4. Submittal of Release of Liens and warranties.
   5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections or shall be per the submittals provided showing products by each Subcontractor.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. The Contractor shall list items that are incomplete in the request (Punch List).

   Scheduling the Substantial Completion Inspection:
   1. Schedule the Substantial Completion Inspection for a time that the work for all Bid and Construction Packages can be observed at one inspection date and, should a follow up inspection be needed to verify punch list compliance, schedule that second inspection to occur at one inspection date unless otherwise agreed. One Certificate of Substantial Completion will be issued for the project.
   2. Provide a schedule or written documentation for when the Punch list items will be complete. Work shall not exceed 45 calendar days.
   3. Advise Owner of pending insurance and utility change-over requirements.
   4.. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
   5. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   6. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Submit test/adjust/balance records. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
   7. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. **Observation Procedures:** On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following the inspection, or advise

the Contractor of construction that must be completed or corrected before the certificate will be issued. Work must be sufficiently complete that the Architect can certify the final Pay Application within 45 days.

1. Upon written statement from the Contractor that the Work is complete, the Architect will repeat the inspection and notification procedure.
2. Results of the completed inspection will form the basis of requirements for final acceptance.
3. Release of Retainage or portions thereof will not be approved without Owner approval or Consent of Surety.
4. Release of retainage or portions thereof will be determined by a multiplier of two (2) applied to all remaining work not complete. Ex. Value = $100.00; Held Value $200.00
5. Also see General and Supplementary General Conditions requirements.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and payment, complete the following. List exceptions in the request. (See Supplementary General Conditions also.)
   1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
   2. Submit a copy of the Substantial Completion inspection list of items to be completed or corrected (punch list), stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.
   4. Submit warranties.
   5. **Submit consent of surety to final payment if required.**
   6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
   3. Submit All Closeout Documents , record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
   8. Submit All Affidavits, Prevailing Wage Final Reports etc.
   9. UPON FINAL PAYMENT FROM OWNER Submit Final Lien waivers.

B. ARCHITECT'S INSPECTION SUMMARY
   1. Architect will conduct one (1) inspection at notification for Substantial Completion.
   2. Architect will conduct only one (1) re- inspection, for determining Substantial Completion.
   3. Architect will conduct one (1) inspection for Final Completion.
   4. Any additional inspections for Substantial Completion, partial completion inspections, or Final Completion will be at the cost of the Subcontractor(s) that is/are incomplete and has delayed Final Completion.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. The CM initiates the Punch List and provides it to the Architect, prior to the Inspection for Substantial Completion. The Architect will amend the List as a part of the Inspection process.

B. Preparation: CM: Submit electronically one copy of list. Include name and identification of each space and area affected by construction operations for incomplete items and items

needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor/CM.
    e. Page number.

1.6 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the CM, Owner and Architect's reference during normal working hours.

B. Record Drawings: 1 PAPER COPY of all Record Drawings, including As-Builts are to be delivered to the CM from the Subcontractor and one digital copy to be emailed and or uploaded to the project website.
Subcontractors are to maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings throughout construction and are to be made available to the CM, Architect or Owner upon request for review of compliance to this section and the contract documents. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. In addition to these hard line documents; Make the documents and owner personnel available to assist the designers in preparing electronic As-Built documents.
    1. Mark record sets with red or blue erasable pen or pencil; use other colors to distinguish between variations in separate categories of the Work.
    2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
    3. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
    4. AS-BUILT DRAWINGS ARE TO BE MATINTAINED DAILY BY EACH SUBCONTRACTOR. If a Subcontractor is found to not be maintaining as-built documentation the CM shall have the authority to hire a registered engineer in the discipline of the non-compliant scope of work to provide the documentation and back charge the subcontractors contract the cost of the engineer having to provide as-built drawings/documentation.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show

substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.

D. Record Product Data: Provide one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data to the Architect for the Owner's records.

E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Architect and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Architect for the Owner's records.

G. Maintenance Manuals: 1 PAPER COPY to be delivered to the CM and one digital copy to be emailed and/or uploaded to the project website when in place. Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:

1. Emergency instructions.
2. Spare parts list.
3. Copies of warranties.
4. Wiring diagrams.
5. Recommended "turn around" cycles.
6. Inspection procedures.
7. Shop Drawings and Product Data.
8. Fixture lamping schedule.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operating and Maintenance Instructions/OWNER TRAINING: Subcontractor shall arrange for each installer of its scope of works equipment that requires regular maintenance

to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. PROVIDE VIDEO DOCUMENTATION OF TRAINING WITH CLOSEOUTS AND Include a detailed review, at minimum of the following items:

1. Maintenance manuals.
2. Record documents.
3. Spare parts and materials.
4. Tools.
5. Lubricants.
6. Fuels.
7. Identification systems.
8. Control sequences.
9. Hazards.
10. Cleaning.
11. Warranties and bonds.
12. Maintenance agreements and similar continuing commitments.

*** As part of instruction for operating equipment, demonstrate the following procedures:
1. Start-up.
2. Shutdown.
3. Emergency operations.
4. Noise and vibration adjustments.
5. Safety procedures.
6. Economy and efficiency adjustments.
7. Effective energy utilization.

1 PAPER COPY OF ALL REQUIRED CLOSEOUT DOCUMENTS is to be delivered by mail to the CM and one digital copy to be uploaded to project website when available.

3.2 FINAL CLEANING:

A. General: General cleaning during construction is required of all Subcontractors by the General Conditions and included in Section "Temporary Facilities" as well as Bid Packages/Scopes of Work.

B. Cleaning: BP 08A Subcontractor or CM when the General Trades in not part of the bid package bidding, include but not limited to Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
   1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
      . Remove labels that are not permanent labels.
      a. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
      b. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
      c. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication

and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

d. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

C. Removal of Protection: Installing Subcontractors shall Remove temporary protection and installing Subcontractors shall remove facilities installed for protection of the Work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
   1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01 77 00

SECTION 024113 - SITE DEMOLITION

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: removal of existing buildings, equipment pads, foundations, paving, curb and gutter, underground tanks, pipes and utilities, fences, and other site items as required by the project drawings.

1.2 SUBMITTALS

A. Obtain necessary permits required for demolition and submit copies to the Owner before beginning site demolition work.

1.3 PROTECTION

A. Protection of Existing Work: Before beginning cutting or other site demolition work, carefully survey the existing work and examine the project drawings and specifications to determine the extent of the work. Take necessary precautions to ensure against damage to existing work to remain in place, to be reused, or to remain the property of the Owner. Repair or replace damage to work at no additional cost to the Owner. Carefully coordinate the work of this section with other work and construct and maintain shoring, bracing and supports, as required. Ensure that structural elements are not overloaded. Increase structural support or add new supports, as required as a result of cutting, removal, or demolition of work performed.

B. Benchmarks, Property Markers, and Iron Pins: The Contractor shall maintain all benchmarks, monuments, property markers, iron pins and other reference points during site clearing operations. In the event that any of the above mentioned are disturbed or destroyed during any construction activities the Contractor shall replace them, as directed by the Owner, at the Contractor's expense.

C. Existing Utilities:

1. Follow rules and regulations of the authorities having jurisdiction for the respective utilities in execution of the work under this section.
2. Active Utilities Shown on Project Drawings: Protect from damage and remove or relocate only as indicated or specified. Take special precautions not to damage utility lines, manholes, or other structures. Correct any damage to utilities or structures to original or better condition at no additional cost to the Owner.
3. Active Utilities Not Shown on Project Drawings: When any functioning underground utilities are uncovered during the work which are not shown on the project drawings, promptly notify the Owner in writing. Protect or relocate in accordance with written instructions of the Owner. The Contractor shall exercise caution during all phases of the work, as all utilities may not be shown on the Project Drawings. A utilities' omission from the Project Drawings will not relieve the Contractor of their responsibility to correct any damage to said utility at no additional cost to the Owner.

4. Inactive and Abandoned Utilities: Remove, plug, or cap in the absence of specific requirements. Plug or cap utility lines at least five feet outside of new building walls or as required by local regulations.

D. Adjacent Properties: Protect adjacent properties during site demolition operations. Site demolition shall be limited to Owner's property. The Contractor shall also protect existing structures on adjacent properties; including by not limited to fences, utility lines, manholes, catch basins, valve boxes, poles, guys and other appurtenances. Damage done to structures on adjacent properties shall be the Contractor's responsibility to repair, at no additional cost to the Owner.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.1 DEMOLITION

A. Structures: Demolish existing structures by breaking these materials into smaller pieces for transport. The use of explosives is not permitted.

B. Utilities: Remove or abandon in place existing utilities as indicated on the project drawings. Disconnect utility services, with related meters and equipment, employing appropriate utility company. When utility lines are encountered that are not indicated on the project drawing, notify the Owner.

C. Sidewalks, driveways, curb and gutter, drainage structures and similar obstructions permitted to be removed shall be cut in straight lines or removed to the nearest construction joint if located within five feet of the edge of the excavation. In no case shall the joint or line of cut be less than one foot outside the edge of excavation.

3.2 RELOCATION AND RETURN OF MATEIRAL OR EQUIPMENT

A. Carefully dismantle, in manner to avoid damage, all materials and equipment specified or indicated to be relocated or returned to the Owner.

B. Store materials and equipment to be reused in a manner to avoid corrosion, staining, breakage, or damage.

C. Material or equipment specified or indicated to be relocated or returned to the Owner and damage due to Contractor's negligence shall be repaired or replaced as directed by Owner.

3.3 DISPOSITION OF MATERIALS

A. Dispose of demolished materials off of the project site unless otherwise notified by the Owner. Transport materials in a manner that will prevent spillage on streets and adjacent areas. Dispose of materials in a manner acceptable to the regulatory agency having jurisdiction.

3.4 PROTECTION OF EXISTING TREES

A. Protect trees to remain in the manner described in Section 31 10 00 Site Clearing.

B. Provide tree protection measures prior to beginning of demolition and maintain throughout the work period.

3.5 BACKFILLING AND COMPACTION

A. Backfill holes and depressions resulting from site demolition in the manner described in Section 31 23 00 Excavation and Fill.

END OF SECTION 024113

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.

B. Related Sections:
1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
2. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semirigid joint filler.
13. Joint-filler strips.
14. Repair materials.

B. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

C. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

D. Field quality-control reports.

E. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

E. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.
e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, [vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

D. Deformed-Steel Wire: ASTM A 496/A 496M.

E. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

F. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F or C.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33 coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

H. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.8 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.9 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Refer to drawings.

B. Foundation Walls: Refer to drawings.

C. Slabs-on-Grade: Refer to drawings.

2.12 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Construct forms tight enough to prevent loss of concrete mortar.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

G. Chamfer exterior corners and edges of permanently exposed concrete.

H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Space vertical joints in walls at 2 times the wall height. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints for Exterior Slabs Only: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated, exposed to view, or to be covered with flooring.

2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed **1/8 inch (3.2 mm)**.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated or exposed to weather. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound

manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other

requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

SECTION 04 20 01 - MASONRY VENEER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete facing unit.
B. Clay facing brick.
C. Pre-Cast Concrete Lintels, Sills, and Caps.
D. Mortar.
E. Reinforcement and anchorage.
F. Flashings.
G. Installation of lintels.
H. Accessories.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Convene one week before starting masonry veneer work.

1.3 SUBMITTALS

A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and anchors.
B. Mix-Design: For pre-cast concrete only.
C. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.
D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
E. Closeout:
    1. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.5 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Above Grade Split Face Concrete Facing Units:
    1. Concrete Brick: Subject to compliance with requirements, provide the following:
        a. Midwest Block & Brick, Eggshell White.
        b. ABC Block & Brick, Ghost.
    2. Finish: Split Face.
B. Below Grade Natural Concrete Facing Units:
    1. Finish: Natural.
C. Concrete Facing Units Block Size: 3-9/16" x 7-5/8" x 15-9/16".
D. Free-Standing Block Size: 7-9/16" x 7-5/8" x 15-9/16".
E. Concrete Masonry Unit Joint Size: 3/8".
F. Concrete Facing Brick: ASTM C1634; solid cored, lightweight above grade, normal weight below grade; for architectural use.

2.2 BRICK UNITS

A. Brick #1
    1. Subject to compliance with requirements, provide the following:
        a. Glen-Gery, Clear Buff Velour.
        b. Endicott Clay Products Company, Golden Buff Velour.
B. Brick #2
    1. Subject to compliance with requirements, provide the following:
        a. Glen-Gery, Prairie Sunset Velour.

b. Endicott Clay Products Company, Coppertone Velour.

C. Facing Brick: ASTM C216, Type FBX, Grade SW.
1. Actual Size: 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
2. Brick Joint Size: 3/8".
3. Special Shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
4. Compressive Strength: Individual Brick: 2200 psi, measured in accordance with ASTM C67.

2.3 PRE-CAST CONCRETE LINTELS, SILLS, AND CAPS

A. Mold Materials
1. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated. Make of materails nonreactive with concrete and suitable for producing required finishes.
a. Form-Release Agent: Commercially produced form-release agent that will not bond with, stain, or affect hardening of precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
2. Form Liners: Units of face design, texture, arrangement, and configuration indicated. Provide solid backing and form supports to ensure that form liners remain in place during concrete placement. Use manufacturer's recommended form-release agent that will not bond with, stain, or adversely affect hardening of precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
3. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete to depth of reveals specified.

B. Material: Utilize the following material in the fabrication of pre-cast concrete lintels, sills, and caps:
1. Portland Cement: ASTM C150/C150M, Type 1 or 3.
a. Color: White.
2. Supplementary Cementitious Materials:
a. Fly Ash: ASTM C618, Class C or F with maximum loss on ignition of 3 percent.
b. Ground Granulated Blast Furnace Slag: ASTM C989/C989M, Grades 100 or 120.
c. Metakaolin: ASTM C618, Class N.
d. Silica Fume: ASTM C1240 with optional chemical and physical characteristics.
3. Aggregates: Stockpile aggregates for each type of exposed finish from a single source.
a. Face Mixture Fine Aggregates: Selected, hard, and durable. Provide free of material that reacts with cement or causes staining.
b. Face mixture Coarse Aggregate: ASTM C33/C33M, Class 5S.
c. Agregate Color: White.
4. Water: Potable, free from deleterious material that may affect color stability, setting, or strength of concrete complying with chemical limits of PCI MNL-117.
5. Air-Entraining Admixture: ASTM C260/C260M, certified by manufacturer to be compatible with other admixtures.
6. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures. Cannot contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
a. Water-Reducing Admixture: ASTM C494/C494M, Type A.
b. Retarding Admixture: ASTM C494/C494M, Type B.
c. Water Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
d. Water Reducing and Accelerating Admixture: ASTM C494/C494M, Type E.

e. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
f. High-Range, Water Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
g. Plasticizing Admixture for Flowable Concrete: ASTM C 1017/C 1017M.
h. Corrosion Inhibiting Admixture: ASTM C 1582/C 1582M.

C. Strucural Performance: Provide precast concrete units and connections capable of withstanding the design loads as identified on the drawings.
D. Concrete Mixtures: Prepare design mixtures for each type of precast concrete required.
1. Supplementary Cementitious Material Permissible Use:
a.
b. Fly Ash: Between Maximum 20 percent replacement of portland cement by weight.
c. Metakaolin: Maximum 10 percent of portland cement by weight.
2. Limit water-soluble chloride ions to a maximum percentage by weight of cement permitted by ACI 318 or PCI MNL-117.
3. Compressive Strength: 5,000 psi minimum at 28 days.
4.

2.4 MORTAR MATERIALS

A. Masonry Cement Above Grade: ASTM C91/C91M Type N.
1. Colored Mortar: Premixed cement as required for Architect to select from manufacturer's full range.
B. Masonry Cement Below Grade: ASTM C91/C91M Type N.
C. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
D. Hydrated Lime: ASTM C207, Type S.
E. Mortar Aggregate: ASTM C144.
F. Water: Clean and potable.

2.5 REINFORCEMENT AND ANCHORAGE

A. Combination Joint Reinforcement and Masonry Anchor: Subject to requirements of structural concrete masonry unit design, provide Hohman & Barnard, Inc. Tie-HVR-295V Anchor System - Ladder Type or a comparable product by one of the following:
1. Wire-Bond.
2. RodenHouse Fastening Systems.
B. Basis-of-Design Product: Subject to compliance with requirements, provide Hohmann & Barnard, Inc ; HB-213 or a comparable product by one of the following:
1. Wire-Bond.
2. RodenHouse Fastening Systems.

2.6 ACCESSORIES

A. Preformed Control Joints: Neoprene material. Provide with corner and tee accessories, fused joints.
B. Joint Filler: Closed cell polyethylene; oversized 50 percent to joint width; self expanding; in maximum lengths available.
C. Weeps:
1. Type: Polyester mesh.
2. Color(s): As selected by Architect from manufacturer's full range.
3. Manufacturers:
a. Mortar Net Solutions; WeepVent: www.mortarnet.com/#sle.
D. Cavity Vents:
1. Type: Extruded propylene with honeycomb design.
2. Color(s): As selected by Architect from manufacturer's full range.
3. Manufacturers:

a. Mortar Net Solutions; CellVent: www.mortarnet.com/#sle.

E. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
1. Mortar Diverter: Panels installed at flashing locations.
a. Manufacturers:
1) Mortar Net Solutions; MortarNet: www.mortarnet.com/#sle.

F. Multicomponent Cavity Wall Drainage System: Combination mortar diverter, flashing and weep system.
1. Membrane Type: Thermoplastic vinyl.
2. Drip Edge: Stainless steel.
3. Termination Bar: Polyvinyl chloride (PVC)
4. System Unit Length: 5 feet, 6 inches.
5. Manufacturers:
a. Mortar Net Solutions; TotalFlash Panel: www.mortarnet.com/#sle.

G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.7 MORTAR MIXING

A. Mortar for Unit Masonry: ASTM C270, Proportion Specification.
1. Masonry below grade and in contact with earth; Type S.
2. Exterior, non-loadbearing masonry; Type N.

B. Colored Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color as selected by Architect.

C. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
1. Bond: Running.
2. Coursing: One unit and one mortar joint to equal 8 inches.
3. Mortar Joints: Concave.

D. Brick Units:
1. Bond: Running.
2. Coursing: Three units and three mortar joints to equal 8 inches.
3. Mortar Joints: Concave.

3.3 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar as work progresses.

E. Interlock intersections and external corners, except for units laid in stack bond.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
H. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.

3.4 WEEPS/CAVITY VENTS

A. Install weeps in veneer walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, at bottom of walls, and any other areas where cavity is interrupted.
B. Install cavity vents in veneer walls at 24 inches on center horizontally below shelf angles and lintels and at top of walls.

3.5 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.6 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Install horizontal joint reinforcement 16 inches on center.
B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
C. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 16" inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

3.7 LINTELS

A. Install loose steel lintels over openings.
B. Maintain minimum 8" inch bearing on each side of opening. Verify with Structural drawings.

3.8 CONTROL AND EXPANSION JOINTS

A. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
B. Size control joints as indicated on drawings; if not indicated, 3/8" inch wide and deep.
C. Form expansion joint as detailed on drawings.

3.9 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.10 CUTTING AND FITTING

A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.
B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.11 CLEANING

A. Remove excess mortar and mortar smears as work progresses.
B. Replace defective mortar. Match adjacent work.
C. Clean soiled surfaces with cleaning solution.
D. Use non-metallic tools in cleaning operations.

3.12 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Steel reinforcing bars.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product. For masonry units, include data on material properties.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.5 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi (14.8 MPa)
2. Density Classification: Normal weight.
3. Finish - Smooth

2.3 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91/C 91M.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.

F. Aggregate for Mortar: ASTM C 144.

G. Aggregate for Grout: ASTM C 404.

H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

I. Water: Potable.

2.4 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
1. Walls: Hot-dip galvanized carbon steel.
2. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
3. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
4. Spacing of Cross Rods: Not more than 16 inches (407 mm) o.c.
5. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

2.5 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:

1. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
2. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Copper-Laminated Flashing: 7-oz./sq. ft. (2-kg/sq. m) copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).

3. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch (1.02 mm).

4. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.

5. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.040 inch (1.0 mm) thick.

C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.7 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime or masonry cement mortar.
4. For reinforced masonry, use portland cement-lime or masonry cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.

3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type S.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type fine or coarse that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 3000 psi (21 MPa).
3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).

2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

F. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.
2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.

F. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

G. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.6 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 48 inches.

3.7 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at seven days and at 28 days.

3.8 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.9 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 05 1200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes structural steel and grout.

1.2 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
   1. Select and complete connections using details indicated.
   2. Use ASD; data are given at service-load level.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:
   1. Show fabrication of structural-steel components: Submit for review and approval shop drawings showing complete details and schedules for fabrication and assembly of structural steel members.
   2. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify the type of high-strength bolted connection (slip-critical, direct-tension, or bearing connections). Holes, flange cuts, slots and openings shall be made as required by the structural drawings, all of which shall be properly located by means of templates.
   3. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.

C. Qualification Data: For qualified fabricator.

D. Welding certificates.

E. Mill test reports for structural steel, including chemical and physical properties.

F. Source quality-control reports.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: The structural steel fabricator must have minimum of 5 years' experience in the successful fabrication of structural steel similar to this project. Provide documentation of 5 projects of similar size and scope successfully completed in the past 5 years.

B. Installer Qualifications: A qualified installer that has a minimum of 5 years' experience and has experience on similar size projects. Provide documentation of 5 projects of similar size and scope successfully completed in the past 5 years.

C. Detailer Qualifications: The structural steel detailer shall have not less than 5 years' experience in the successful detailing of structural steel similar to this project including experience in selecting or completing structural steel connection details using information found in tables in the AISC "Steel Construction Manual.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

E. Comply with applicable provisions of the following specifications and documents:
   1. AISC 303.
   2. AISC 360. "Specification for Structural Steel Buildings".
   3. RCSC's "Specification for Structural Joints using High-Strength Bolts".
   4. ANSI/AISC 358, "Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications
   5. ANSI/AWS D1.1 "Structural Welding Code -Steel.

F. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. Do not store materials on structure in a manner that might exceed allowable loads on or cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed by Architect/Engineer.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL

A. All structural or miscellaneous support steel exposed to the exterior shall be non-galvanized ferrous metal with a High Performance Coating (Work of Section 099600), except as follows:
   1. Steel bollards shall be galvanized (or coated with a High Performance Coating).

B. W-Shapes: ASTM A 992/A 992M.

C. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.

D. Plate and Bar: ASTM A 36/A 36M.

E. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50 (345).

F. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

G. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.

H. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
   1. Finish: Black except where indicated to be galvanized.

I. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex or round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Plain.

C. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
   1. Configuration: Straight.
   2. Finish: Plain.

D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
   1. Finish: Plain.

E. Threaded Rods: ASTM A 36/A 36M.
   1. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

2.3 PRIMER

A. Primer: Fabricator to shop prime with standard primer. Primer to be non-asphaltic rust inhibitor, lead and chromate free.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Pretensioned.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:
   1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
   2. Surfaces to be field welded.
   3. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 2, "Hand Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SOURCE QUALITY CONTROL

A. Testing Agency: General Contractor will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
   1. Liquid Penetrant Inspection: ASTM E 165.
   2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   3. Ultrasonic Inspection: ASTM E 164.

4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Pretensioned.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
   1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      c. Ultrasonic Inspection: ASTM E 164.
      d. Radiographic Inspection: ASTM E 94.

D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 051200

SECTION 05 3100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Roof deck.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:
   1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
   1. Power-actuated mechanical fasteners.

D. Evaluation Reports: For steel deck.

E. Field quality-control reports.

1.5 ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

1.6 Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Canam United States; Canam Group Inc.
   2. Nucor Corp.; Vulcraft Group.
   3. Or equal.

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
   1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230) zinc coating.
   2. Deck Profile: As indicated on structural drawings.
   3. Profile Depth: As indicated on structural drawings.
   4. Design Uncoated-Steel Thickness: As indicated.
   5. Span Condition: Triple span or more.
   6. Side Laps: Overlapped.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile indicated.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch (1.90 mm) thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.

I. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

J. Galvanizing Repair Paint: ASTM A 780.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

2.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

2.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by welding or mechanically fastening, and as follows:
   1. As indicated on drawings.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 36 inches (914 mm), or as indicated on the Drawings, and as follows:
   1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with end joints as follows:
   1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches (305 mm) apart with at least one weld at each corner.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
   1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

2.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

2.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 054400 - COLD-FORMED METAL TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cold-formed steel trusses for roofs.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for cold-formed steel studs, joists, and rafters.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.

2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel trusses.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.

1. Steel sheet.

2. Expansion anchors.

3. Power-actuated anchors.

4. Mechanical fasteners.

5. Miscellaneous structural clips and accessories.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel trusses from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.

2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:

a. Roof Trusses: Vertical deflection of 1/360 of the span.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).

C. Cold-Formed Steel Framing Design Standards:

1. Roof Trusses: Design according to AISI S214.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 COLD-FORMED STEEL TRUSS MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, structural grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.

2. Coating: G60 (Z180), A60 (ZF180), AZ50 (AZ150) or equivalent.

2.3 ROOF TRUSSES

A. Roof Truss Members: Manufacturer's standard steel sections.

1. Connecting Flange Width: 1-5/8 inches (41 mm), minimum at top and bottom chords connecting to sheathing or other directly fastened construction.

2.4 ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, structural grade, Type H, metallic coated, of same grade and coating weight used for truss members.

B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Power-Actuated Fasteners: Fastener system of type suitable for application, fabricated from corrosion-resistant materials, with capability to sustain, without failure, allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.

B. Shims: Load bearing, of high-density multimonomer plastic, nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

2.7 FABRICATION

A. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate trusses using jigs or templates.

2. Cut truss members by sawing or shearing; do not torch cut.

3. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

4. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting cold-formed steel trusses for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install, bridge, and brace cold-formed steel trusses according to AISI S200, AISI S214, AISI's "Code of Standard Practice for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened.

1. Fasten cold-formed steel trusses by welding or mechanical fasteners.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings; comply with requirements for spacing, edge distances, and screw penetration.

C. Install temporary bracing and supports. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

D. Truss Spacing: As indicated.

E. Do not alter, cut, or remove framing members or connections of trusses.

F. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.

G. Erect trusses without damaging framing members or connections.

H. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's TechNote 551e, and "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses."

I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Provide periodic inspections for the following:

a. Truss member sizes, spacings and gauges are in accordance with the approved shop drawings.

b. Connections of cold-formed members to supportive structure and to other cold-formed members are in accordance with the approved shop drawings.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Field and shop welds will be subject to testing and inspecting.

D. Prepare test and inspection reports.

3.4 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal trusses are without damage or deterioration at time of Substantial Completion.

END OF SECTION 054400

SECTION - 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Steel framing and supports for overhead doors.
3. Steel framing and supports for countertops.
4. Steel tube reinforcement for low partitions.
5. Steel framing and supports for mechanical and electrical equipment.
6. Steel framing and supports for applications where framing and supports are not specified in other Sections.
7. Steel pipe columns for supporting wood frame construction.
8. Miscellaneous steel trim.
9. Metal bollards.

B. Products furnished, but not installed, under this Section:

1. Loose steel lintels

2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry

3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections

C. Related Sections:

1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.

2. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.

3. Section 051200 "Structural Steel Framing."

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Paint products.

2. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: **1-5/8 by 1-5/8 inches., or as required.**

2. Material: ASTM A 653/A 653M, **Grade 33**, with standard coating.

F. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

G. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 ; with hex nuts, ASTM F 594 ; and, where indicated, flat washers; Alloy Group 13.

D. Eyebolts: ASTM A 489.

E. Machine Screws: ASME B18.6.3.

F. Lag Screws: ASME B18.2.1.

G. Wood Screws: Flat head, ASME B18.6.1.

H. Plain Washers: Round, ASME B18.22.1.

I. Lock Washers: Helical, spring type, ASME B18.21.1.

J. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

L. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

M. Post-Installed Anchors: Torque-controlled expansion anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593 , and nuts, ASTM F 594.

N. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting," Section 099123 Interior Painting,"and Section 099600 "High-Performance Coatings."

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

G. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.

2. Furnish inserts for units installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where indicated.

D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize **and prime exterior** miscellaneous steel trim.

2.8 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe.

1. Cap bollards with 1/4-inch- thick steel plate.

2. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.

3. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.

B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch-thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.

C. Galvanize and prime bollards with zinc-rich primer.

2.9 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates.

C. Prime plates with zinc-rich primer.

2.10 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Galvanize loose steel lintels located in exterior walls.

C. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.11 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.12 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.13 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

C. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

2.14 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

1. Do not fill removable bollards with concrete.

B. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.

C. Fill non-capped bollards solidly with concrete, mounding top surface to shed water.

1. Do not fill removable bollards with concrete.

3.4 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.

2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall mounted handrails.
B. Stair railings and guardrails.
C. Free-standing railings at steps.
D. Balcony railings and guardrails.

1.2 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.3 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

PART 2 PRODUCTS

2.1 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 50 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
D. Allow for expansion and contraction of members and building movement without damage to connections or members.
E. Dimensions: See drawings for configurations and heights.
    1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
    2. Intermediate Rails: 1-1/2 inches diameter, round.
    3. Posts: 1-1/2 inches diameter, round.
    4. Balusters: 1/2 inch square solid bar.
F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
    1. For anchorage to stud walls, provide backing plates, for bolting anchors.
    2. Posts: Provide adjustable flanged brackets.
G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.2 STEEL RAILING SYSTEM

A. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.
B. Steel Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.
C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
D. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.3 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.
B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Interior Components: Continuously seal joined pieces by continuous welds.
   3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.2 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.
B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
D. Anchor railings securely to structure.
E. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.
F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
B. Maximum Offset From True Alignment: 1/4 inch.
C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 10 10 - NON-STRUCTURAL ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-structural dimensional lumber framing.
B. Wall Sheathing, non-structural only.
C. Miscellaneous framing and sheathing.
D. Communications and electrical room mounting boards.
E. Concealed wood blocking, nailers, and supports.
F. Miscellaneous wood nailers, furring, and grounds.

1.2 SUBMITTALS

A. Product Data: Provide technical data on non-structural wall sheathing.

1.3 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation. Do not stack wood products in contact with ground.
B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20.
   1. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
   2. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
B. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSIONAL LUMBER

A. Sizes: Nominal sizes as indicated on drawings, S4S.
B. Moisture Content: S-dry or MC19.
C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.

2.3 EXPOSED BOARDS

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
B. Moisture Content: Kiln-dry (15 percent maximum).
C. Surfacing: S4S.
D. Species: Southern Pine.
E. Grade: No. 3, 3 Common, or Standard.

2.4 CONSTRUCTION PANELS

A. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.
   1. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Edges: Square.
B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.5 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Anchors: Toggle bolt type for anchorage to hollow masonry.

B. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.
1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

2.6 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Preservative Treatment:
1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification Ausing waterborne preservative.
a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
b. Treat lumber exposed to weather.
c. Treat lumber in contact with masonry or concrete.
d. Treat lumber less than 18 inches above grade.
e. Treat lumber in other locations as indicated.
2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification Fusing waterborne preservative.
a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
b. Treat plywood in contact with masonry or concrete.
c. Treat plywood less than 18 inches above grade.
d. Treat plywood in other locations as indicated.
3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification Ausing waterborne preservative.
a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.3 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
F. Provide the following specific non-structural framing and blocking:
    1. Cabinets and shelf supports.
    2. Wall brackets.
    3. Handrails.
    4. Grab bars.
    5. Towel and bath accessories.
    6. Wall-mounted door stops.
    7. Chalkboards and marker boards.
    8. Wall paneling and trim.
    9. Joints of rigid wall coverings that occur between studs.
    10. Wall Mounted Televisions. .

3.4 INSTALLATION OF CONSTRUCTION PANELS

A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearingand staggered, using nails, screws, or staples.
B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
    1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
    2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
    3. Install adjacent boards without gaps.
C. Wall Sheathing with Laminated Water-Resistive Barrier and Air Barrier: Secure to studs as recommended by manufacturer.
    1. Install with laminated water-resistive and air barrier on exterior side of sheathing.
    2. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
    3. Use only mechanically attached and drainable EIFS and exterior insulation with wall sheathing with laminated water-resistive and air barrier.
    4. Apply manufacturer's standard seam tape to joints between sheathing panels. Use tape gun or hard rubber roller as recommended by manufacturer.

3.5 CLEANING

A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

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SECTION 06 41 00 - ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Specially fabricated cabinet units.
B. Hardware.
C. Factory finishing.
D. Preparation for installing utilities.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.3 SUBMITTALS

A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
B. Product Data: Provide data for hardware accessories.
C. Samples: Submit actual sample items of proposed pulls, hinges, and locksets, demonstrating hardware design, quality, and finish.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.6 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.1 CABINETS

A. Quality Standard: Custom Grade
B. Plastic Laminate Faced Cabinets: Custom grade.
C. Cabinets:
    1. Finish - Exposed Exterior Surfaces: Decorative laminate.
    2. Finish - Concealed Surfaces: Melamine.
    3. Finish - Exposed Interior Surfaces: Decorative laminate.
    4. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
    5. Door and Drawer Front Retention Profiles: Fixed panel.
    6. Casework Construction Type: Type A - Frameless.
    7. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.
    8. Adjustable Shelf Loading: 50 lbs. per sq. ft.
        a. Deflection: L/144.
    9. Cabinet Style: Flush overlay.
    10. Cabinet Doors and Drawer Fronts: Flush style.

2.2 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.3 LAMINATE MATERIALS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
    1. Formica Corporation.
    2. Panolam Industries International, Inc; Nevamar.
    3. Wilsonart.
    4. Pionite Decorative Surfaces.
B. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.

C. Provide specific types as follows:
   1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as indicated, finish as indicated.
   2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as indicated, finish as indicated.
   3. Post-Formed Horizontal Surfaces: HGP, 0.039 inch nominal thickness, through color, colors as indicated, finish as indicated.
   4. Post-Formed Vertical Surfaces: VGP, 0.028 inch nominal thickness, through color, colors as indicated, finish as indicated.
   5. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, color as selected, finish as indicated.
   6. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.4 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.
B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
   1. Color: As selected by Architect from manufacturer's standard range.
   2. Use at all exposed plywood edges.
   3. Use at all exposed shelf edges.
C. Fasteners: Size and type to suit application.
D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
E. Concealed Joint Fasteners: Threaded steel.
F. Grommets: Standard plastic grommets for cut-outs, in color verify color with Architect.

2.5 HARDWARE

A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
B. Adjustable Shelf Supports: Standard side-mounted system using surface mounted metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
C. Fixed Specialty Workstation and Countertop Brackets:
   1. Material: Steel.
   2. Color: Selected by Architect from manufacturer's standard range.
   3. Manufacturers:
      a. A&M Hardware, Inc; Concealed Brackets: http://www.aandmhardware.com/#sle.
      b. Rakks/Rangine Corporation; Inside Wall Flush Mount Brackets: www.rakks.com/#sle
D. Fixed Standard Shelf, Countertop, and Workstation Brackets:
   1. Material: Steel.
   2. Color: Selected by Architect from manufacturer's standard range.
   3. Products:
      a. A&M Hardware, Inc; Standard Brackets.
E. Fixed Americans with Disabilities Act (ADA)-Compliant Vanity and Countertop Brackets:
   1. Material: Steel.
   2. Color: Selected by Architect from manufacturer's standard range.
   3. Products:
      a. A&M Hardware, Inc ; ADA Vanity Brackets.
F. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.
G. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with satin finish.

H. Catches: Magnetic.
I. Drawer Systems: Integrated drawer slide and side.
   1. Side Type: Single Wall.
   2. Drawer Side Height: 5-7/8 inches.
   3. Drawer Length: 18 inch.
   4. Extension Type: Standard extension.
   5. Static Load Capacity: Residential/Light Commercial grade.
   6. Mounting: Side mounted.
   7. Stops: Integral type.
   8. Features: Provide self closing/stay closed and white epoxy finish type.
J. Hinges: European style concealed self-closing type, steel with satin finish.
K. Door and Drawer Silencers: BHMA A156.16, L03011.

2.6 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
C. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
   1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
   2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
D. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
   1. Provide center matched panels at each elevation.
   2. Provide sequence matching across each elevation.
   3. Carry figure of cabinet fronts to toe kicks.
E. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.
F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.7 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.
B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.
B. Verify location and sizes of utility rough-in associated with work of this section.

3.2 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
B. Use fixture attachments in concealed locations for wall mounted components.
C. Use concealed joint fasteners to align and secure adjoining cabinet units.
D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
E. Secure cabinets to floor using appropriate angles and anchorages.
F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.3 ADJUSTING

A. Test installed work for rigidity and ability to support loads.
B. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 06 83 16 - FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiberglass reinforced plastic panels.
B. Trim.

1.2 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fiberglass Reinforced Plastic Panels:
   1. Crane Composites, Inc.
   2. Marlite, Inc.
   3. Nudo Products, Inc.
   4. Panolam Industries International, Inc.

2.2 PANEL SYSTEMS

A. Wall Panels:
   1. Basis-of-Design Product: Subject to compliance with requirements, provide **Crane Composites, Inc; Glasbord with Surfaseal** or comparable product by an approved Manufacturer.
   2. Panel Size: 4 by 8 feet.
   3. Panel Thickness: 0.09 inch.
   4. Surface Design: Embossed.
   5. Color: As indicated on Drawings.
   6. Attachment Method: Adhesive only, with trim and sealant in joints.
   7. Adhesive: Type recommended by panel manufacturer.
   8. Trim: Manufacturer's coordinating Vinyl/PVC moldings.
   9. Sealant: Type recommended by panel manufacturer, color matching panel.

2.3 MATERIALS

A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
   1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
B. Adhesive: Type recommended by panel manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.
B. Verify that substrate conditions are ready to receive the work of this section.
C. Verify that layout of hangers will not interfere with other work; make adjustments in layout as necessary.
D. Do not begin ceiling installation until services above ceiling are complete except for final trim

3.2 INSTALLATION - WALLS

A. Install panels in accordance with manufacturer's instructions.
B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.

E. Install panels with manufacturer's recommended gap for panel field and corner joints.
F. Place trim on panel before fastening edges, as required.
G. Fill channels in trim with sealant before attaching to panel.
H. Install trim with adhesive and screws or nails, as required.
I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
J. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Bituminous dampproofing.

1.2 SUBMITTALS

A. Product Data: Provide properties of primer, bitumen, and mastics.

B. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.3 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: Subject to compliance with requirements, provide BASF Corp - Construction Chemicals; Masterseal 610, 614, & 615or comparable product by one of the following:.

B. Other Acceptable Bituminous Dampproofing Manufacturers:

1. Karnak Corporation.
2. Mar-Flex Systems, Inc.
3. W. R. Meadows, Inc.

2.2 BITUMINOUS DAMPPROOFING

A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.

1. Composition - Vertical Application: ASTM D1227 Type III or ASTM D1187/D1187M Type I.
2. Composition - Horizontal and Low-Slope Application: ASTM D1227 Type II or III.
3. VOC Content: Not more than permitted by local, State, and federal regulations.
4. Applied Thickness: 1/16 inch, minimum, wet film.

B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

2.3 BITUMEN MATERIALS

A. Cold Asphaltic Type:

1. Bitumen: Emulsified asphalt, ASTM D1227with fiber reinforcement other than asbestos (Type II).
2. Asphalt Primer: ASTM D41/D41M, compatible with substrate.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.

B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

3.3 APPLICATION

A. Apply two coats of asphalt dampproofing.

B. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
C. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
D. Prime surfaces at a rate approved by manufacturer for application indicated, and allow primer to dry thoroughly.
E. Apply bitumen with a trowel, brush, roller or spray.
F. Apply bitumen in one coat, continuous and uniform, at a rate of 25 sq ft/gal per coat.
G. Apply from 2 inches below finish grade elevation down to top of footings.
H. Seal items watertight with mastic, that project through dampproofing surface.
I. Place drainage panel directly over dampproofing, butt joints, place to encourage drainage downward.
J. Place protection board over drainage panel, butt joints, and adhere with mastic.
K. Scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION

SECTION 07 13 00 - SHEET WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sheet Waterproofing:
   1. Self-adhered modified bituminous sheet membrane.

1.2 SUBMITTALS

A. Product Data: Provide data for membrane.
B. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.
C. Manufacturer's Installation Instructions: Indicate special procedures.
D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.3 QUALITY ASSURANCE

A. Membrane Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.4 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until liquid or mastic accessories have cured.

1.5 WARRANTY

A. Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no extra cost to Owner.
B. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water, except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.1 WATERPROOFING APPLICATIONS

A. Self-Adhered Modified Bituminous Sheet Membrane:

2.2 MEMBRANE MATERIALS

A. Self-Adhered Modified Bituminous Sheet Membrane:
   1. Thickness: 60 mil, 0.060 inch, minimum.
   2. Sheet Width: 36 inch, minimum.
   3. Tensile Strength:
      a. Membrane: 325 pounds per square inch, minimum, measured according to ASTM D412 Method A, using die C and at spindle-separation rate of 2 inches per minute.
   4. Elongation at Break: 300 percent, minimum, measured according to ASTM D412.
   5. Water Vapor Permeance: 0.05 perm, maximum, measured in accordance with ASTM E96/E96M.
   6. Low Temperature Flexibility: Unaffected when tested according to ASTM D1970/D1970M at minus 20 degrees F, 180 degree bend on 1 inch mandrel.
   7. Peel Strength: 7 pounds per inch, minimum, when tested according to ASTM D903.
   8. Puncture Resistance: 50 pounds, minimum, measured in accordance with ASTM E154/E154M.
   9. Water Absorption: 0.1 percent increase in weight, maximum, measured in accordance with ASTM D570, 24 hour immersion.
   10. Hydrostatic Resistance: Resists the weight of 200 feet when tested according to ASTM D5385/D5385M.
   11. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.

12. Products: Subject to compliance with requirements, provide one of the following::
    a. Carlisle Coatings & Waterproofing Inc; MiraDRI 860/861: www.carlisleccw.com/#sle.
    b. GCP Applied Technologies; Bituthene 3000: www.gcpat.com.
    c. Henry Company; Blueskin WP 200: www.henry.com/#sle.
    d. Polyguard Barrier Systems, Inc, a division of Polyguard Products, Inc; TERM Foundation Barrier: www.polyguardbarriers.com/#sle.
    e. W.R. Meadows, Inc; MEL-ROL: www.wrmeadows.com/#sle.
    f. Substitutions: See Section 01 60 00 - Product Requirements.

B. Seaming Materials: As recommended by membrane manufacturer.
C. Membrane Sealant: As recommended by membrane manufacturer.
D. Termination Bars: Aluminum; compatible with membrane and adhesives.
E. Surface Conditioner: Liquid, waterborne type, compatible with membrane.
F. Adhesives: As recommended by membrane manufacturer.

2.3 ACCESSORIES

A. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.
B. Cant Strips: Bitumen impregnated fiberboard.
C. Flexible Flashings: Type recommended by membrane manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions are acceptable prior to starting this work.
B. Verify substrate surfaces are durable; free of matter detrimental to adhesion or application of waterproofing system.
C. Verify items that penetrate surfaces to receive waterproofing are securely installed.

3.2 PREPARATION

A. Protect adjacent surfaces from damage not designated to receive waterproofing.
B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions; vacuum substrate clean.
C. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.
D. Fill non-moving joints and cracks with a filler compatible with waterproofing materials.
E. Seal moving cracks with sealant and non-rigid filler, using procedures recommended by sealant and waterproofing manufacturers.
F. Prepare building expansion joints at locations as indicated on drawings.
G. Surfaces for Adhesive Bonding: Apply surface conditioner at a rate recommended by manufacturer, and protect conditioner from rain or frost until dry.
H. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate according to ASTM D5295/D5295M.
    1. Remove substances that inhibit adhesion including form release agents, curing compounds admixtures, laitance, moisture, dust, dirt, grease and oil.
    2. Repair surface defects including honeycombs, fins, tie holes, bug holes, sharp offsets, rutted cracks, ragged corners, deviations in surface plane, spalling and delaminations, as described in the reference standard.
    3. Remove and replace areas of defective concrete as specified in Section 03 30 00.
    4. Prepare concrete for adhesive bonded waterproofing using mechanical or chemical methods described in the referenced standard.
    5. Test concrete surfaces as described in the referenced standards. Verify surfaces are ready to receive adhesive bonded waterproofing membrane system.

3.3 INSTALLATION - MEMBRANE

A. Install membrane waterproofing in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
B. Roll out membrane, and minimize wrinkles and bubbles.
C. Overlap edges and ends, minimum 3 inches, seal permanently waterproof by method recommended by manufacturer, and apply uniform bead of sealant to joint edge.
D. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.
E. Weather lap joints on sloped substrate in direction of drainage, and seal joints and seams.
F. Install building expansion joints at locations as indicated on drawings.
G. Flexible Flashings: Seal items watertight that penetrate through waterproofing membrane with flexible flashings.
H. Extend membrane over cants and up intersecting surfaces at membrane perimeter minimum 6 inches above horizontal surface for first ply and 4 inches at subsequent plies laid in shingle fashion.
I. Seal membrane and flashings to adjoining surfaces.
    1. Install termination bar along edges.

3.4 PROTECTION

A. Do not permit traffic over unprotected or uncovered membrane.

END OF SECTION

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SECTION 07 19 00 - WATER REPELLENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water repellents applied to exteriormasonry surfaces.

1.2 SUBMITTALS

A. Product Data: Provide product description.
   1. Include manufacturer's printed statement of VOC content.
   2. Include manufacturer's standard color samples.
   3. Include manufacturer's recommended number of coats for each type of substrate and spreading rate of each separate coat.

B. Manufacturer's Qualification Statement.

C. Installer's Qualification Statement.

D. Sample Warranty: For Special Warranty.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

C. Owner reserves the right to provide continuous independent inspection of surface preparation and application of water repellent.

1.4 FIELD CONDITIONS

A. Protect liquid materials from freezing.

B. Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellants to be applied according to manufacturer's written instructions and warranty requirements:
   1. Concrete surfaces and mortar have cured for not less than 28 days.
   2. Building has been closed in for not less than 30 days before treating wall assemblies.
   3. Ambient temperature is above 40 deg F and below 100 deg F and will remain so for 24 hours minimum.
   4. Substrate is not frozen and substrate-surface temperature is above 40 deg F and below 100 deg F.
   5. Rain or snow is not predicted for 24 hours minimum.
   6. Not less than 24 hours have passed since surfaces were wet.
   7. Windy conditions do not exist that might cause water repellant to be blown onto vegetation or surfaces not intended to be treated.

1.5 WARRANTY

A. Provide five year manufacturer warranty for repair and/or replacement of materials that fail to maintain water repellency.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Silane, Siloxane, Silane-Siloxane Blend, and Siliconate Water Repellents:
   1. Basis-of-Design Product: Subject to compliance with requirements, provide PROSOCO, Inc., Siloxane PD or comparable product by one of the following:
      a. BASF Construction Chemicals.
      b. Pecora Corporation.
      c. Tnemec Company, Inc.
      d. Sika Corporation

2.2 MATERIALS

A. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.

1. Applications: Vertical surfaces and non-traffic horizontal surfaces.
2. VOC Content: Less than 400 g/L, when tested in accordance with ASTM D3960 or ASTM D5095.
3. Moisture Absorption When Applied to Masonry: 80 percent minimum reduction, when tested in accordance with ASTM C140/C140M using masonry sample completely coated with water repellent.
4. Moisture Absorption When Applied to Concrete: 80 percent minimum reduction, when tested in accordance with ASTM C642 concrete sample completely coated with water repellent.
5. Moisture Absorption When Applied to Clay Brick: 80 percent minimum reducation, when tested in accordance with ASTM C67 brick sample completely coated with water repellant.
6. Water Vapor Transmission: Comply with one or both of the following:
   a. Maximum 10 percent reduction water-vapor transmission of treated compared to untreated specimens, according to ASTM E 96/E 96M.
   b. Minimum 80 percent water-vapor transmission of treated compared to untreated specimens, according to ASTM D 1653.
7. Water Penetration and Leakage through Masonry: Minimum 90 percent reduction in leakage rate of treated compared to untreated specimens, according to ASTM E514/E514M.
8. Durability: Maximum 5 percent loss of water-repellent performance after 2500 hours of weathering according to ASTM G154 compared to water-repellent-treated specimens before weathering.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify joint sealants are installed and cured.
C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

3.2 PREPARATION

A. Protection of Adjacent Work:
   1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
   2. Protect adjacent surfaces not intended to receive water repellent.
B. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.
C. Do not start work until masonry mortar substrate is cured a minimum of 60 days.
D. Remove loose particles and foreign matter.
E. Remove oil and foreign substances with a chemical solvent that will not affect water repellent.
F. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

3.3 APPLICATION

A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.
B. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

END OF SECTION

SECTION 07 21 00 - THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Board insulation at cavity wall construction, perimeter foundation wall, and underside of floor slabs.
B. Batt insulation in exterior wall, ceiling, and roof construction.
C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.2 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
B. Protect foam-plastic board insulation as follows:
    1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
    2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
    3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 PRODUCTS

2.1 APPLICATIONS

A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
B. Insulation Inside Masonry Cavity Walls: Extruded polystyrene (XPS) board.
C. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.

2.2 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation Perimeter Foundation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
    1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
    2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
    3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
    4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
    5. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
    6. Manufacturers:
        a. Dow Chemical Company.
        b. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi.
        c. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation.
        d. DiversiFoam Products; CertiFoam XPS.
B. Extruded Polystyrene (XPS) Continuous Insulation (CI) Board: Complies with ASTM C578, and manufactured using carbon black technology.
    1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
    2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
    3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
5. Board Size: 48 inch by 96 inch.
6. Board Thickness: 2-3/16 inch.
7. Board Edges: Shiplap, at long edges.
8. Type and Water Absorption: Type XII, 0.3 percent by volume, maximum, by total immersion.
9. Manufacturers:
    a. DuPont de Nemours, Inc; STYROFOAM Brand Ultra SL (Shiplap).

C. Extruded Polystyrene (XPS) Cavity Insulation: Complies with ASTM C578, and manufactured using carbon black technology.
1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
5. Board Size: 15-3/4 inch by 96 inch.
6. Board Thickness: 2-3/16 inch.
7. Board Edges: Square.
8. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
9. Manufacturers:
    a. DuPont de Nemours, Inc; STYROFOAM Brand CAVITYMATE Ultra.

2.3 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
4. Manufacturers:
    a. CertainTeed Corporation.
    b. Johns Manville.
    c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation.
    d. Knauf Insulation.

2.4 ACCESSORIES

A. Insulation for Miscellaneous Voids:
1. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

C. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

C. Clean substrate of substances that are harmvul to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

3.3 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install boards horizontally on foundation perimeter.

1. Butt edges and ends tightly to adjacent boards and to protrusions.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.4 BOARD INSTALLATION AT EXTERIOR WALLS

A. Install boards horizontally on walls.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

3.5 BOARD INSTALLATION AT CAVITY WALLS

A. Install boards to fit snugly between wall ties.

B. Install boards horizontally on walls.

1. Install in running bond pattern.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

D. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

3.6 BOARD INSTALLATION AT CONCRETE SLABS

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.
2. Place insulation under slabs on grade after base for slab has been compacted.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

D. Prevent insulation from being displaced or damaged whileplacing vapor retarder and placing slab.

3.7 BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in exterior wall and ceiling spaces without gaps or voids. Do not compress insulation.

C. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.

D. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
E. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
F. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
G. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
H. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
    1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.8 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.
B. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07 25 00 - WEATHER BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.2 DEFINITIONS

A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.

B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

C. Water Vapor Permeance: For purposes of conversion, 57.2 ng/(Pa s sq m) = 1 perm.

1.3 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference: Conduct at Project Site.

1.4 SUBMITTALS

A. Product Data: Provide data on material characteristics, performance criteria, and limitations.

1.5 QUALITY ASSURANCE

A. A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.1 WEATHER BARRIER ASSEMBLIES

A. Air Barrier:

1. On outside surface of inside wythe of exterior masonry cavity walls use air barrier coating.
2. On outside surface of sheathing of exterior walls use air barrier coating.

2.2 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

A. Air Barrier, Fluid Applied: Vapor permeable, elastomeric waterproofing.

1. Air Barrier Coating:
   a. Air Permeance: 0.0004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
   b. Water Vapor Permeance: 18 perms, minimum, when tested in accordance with ASTM E96/E96M, Procedure B.
   c. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for up to 6 months of weather exposure after application.
   d. Elongation: 300 percent, minimum, when tested in accordance with ASTM D412.
   e. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
   f. Nail Sealability: Pass, when tested in accordance with ASTM D1970/D1970M.
   g. VOC Content: 50 g per L or less.
   h. Sealants, Tapes and Accessories: As recommended by coating manufacturer.
   i. Products: Subject to compliance with requirements, provide one of the following:
      1) DuPont Building Innovations; Tyvek Fluid Applied WB+ with Tyvek Fluid Applied Flashing and Joint Compound, Sealant for Tyvek Fluid Applied System and StraightFlash.
      2) Henry Company; Air-Bloc 17MR.
      3) Master Wall, Inc; Rollershield LAB System.

4) Parex USA, Inc; Parex USA WeatherSeal Trowel-on (with gauging aggregate).
5) Parex USA, Inc; Parex USA WeatherSeal Spray & Roll-on.
6) PROSOCO, Inc; R-GUARD Cat 5.
7) PROSOCO, Inc; R-GUARD Spray Wrap MVP.
8) Sto Corp; Sto Gold Coat.
9) Sto Corp; Sto EmeraldCoat.

2.3 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

B. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
1. Composition: Any material that meets physical requirements of ASTM D1970/D1970M with exceptions indicated.
2. Manufacturers:
a. DuPont Building Innovations; FlexWrap NF.
b. DuPont Building Innovations; StraightFlash.
c. DuPont Building Innovations; StraightFlash VF.
d. Fortifiber Building Systems Group; FortiFlash.
e. Fortifiber Building Systems Group; FortiFlash Commercial.
f. Fortifiber Building Systems Group; FortiFlex.
g. Fortifiber Building Systems Group; FortiFlash Butyl.
h. SIGA Cover Inc; SIGA-Wigluv.

C. Liquid Flashing: One part, fast curing, non-sag, elastomeric, gun grade, trowelable liquid flashing.
1. Manufacturers:
a. BASF Corporation; MasterSeal AWB 900.
b. Master Wall Inc; SuperiorFlash.
c. Pecora Corporation.

D. Stainless Steel Flashing: Flexible flashing with 8 mil, 0.008 inch thick sheet of Type 304 stainless steel, 8 mil, 0.008 inch of butyl adhesive and a siliconized release liner.
1. Roll Length: 50 feet long.
2. Width: 6 inch wide.
3. Overlap joints at least 2 inch.

E. Liquid Flashing: One part, fast curing, non-sag, gun grade, trowelable liquid flashing.
1. Manufacturers:
a. Dow Chemical Company; DOWSIL 778 Silicone Liquid Flashing.
b. Dow Chemical Company; DOWSIL 791 Silicone Weatherproofing Sealant.
c. Momentive Performance Materials, Inc/GE Construction Sealants; Elemax 5000 Liquid-Applied Flashing.
d. Parex USA, Inc; Parex USA WeatherTECH with WeatherFlash.
e. Polyglass USA, Inc; PolyFlash 1C One Part Flashing compound.

F. Termite-Resistant Barrier Seam and Window Flashing: Peel and stick flashing membrane; polyethylene film bonded to sealant.
1. Thickness: 40 mil, 0.040 inch overall.
2. Roll Width: 4 inch.
3. Manufacturers:
a. Polyguard Barrier Systems, Inc, a division of Polyguard Products, Inc; TERM Seam and Window Barrier.

G. Thinners and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.2 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.3 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.

D. Mechanically Fastened Sheets - On Exterior:

1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
2. Overlap seams as recommended by manufacturer but at least 6 inches.
3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
4. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
5. Where stud framing rests on concrete or masonry, extend lower edge of sheet at least 4 inches below bottom of framing and seal to foundation with sealant.
6. Install air barrier and vapor retarder UNDER jamb flashings.
7. Install head flashings under weather barrier.
8. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.

E. Coatings:

1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
2. Where exterior masonry veneer is to be installed, install masonry anchors before installing weather barrier over masonry; seal around anchors air tight.
3. Use flashing to seal to adjacent construction and to bridge joints.

F. Openings and Penetrations in Exterior Weather Barriers:

1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.4 FIELD QUALITY CONTROL

A. Do not cover installed weather barriers until required inspections by manufacturer for warratny conformance (if applicable) have been completed.
B. Take digital photographs of each portion of the installation prior to covering up.

3.5 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 41 13 - METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Architectural roofing system of preformed steel panels.
B. Roof insulation.

1.2 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
   3. Specimen warranty.
B. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
C. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
D. Installer Qualification Certificates.

1.3 CLOSEOUT SUBMITTALS

A. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
B. Installer Qualifications: Certified installer for performing work of the type specified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.6 WARRANTY

A. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of twenty years from Date of Substantial Completion.
B. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of twenty years from Date of Substantial Completion. A representative of the manufacturer must be on-site during installation to verify compliance with manufacturer's warranty conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Subject to compliance with requirements provide MBCI, Double Lok SS.
B. Other Acceptable Manufacturers; Metal Roof Panels:
   1. ATAS International, Inc.
   2. Berridge Manufacturing Company.
   3. Firestone Building Products LLC.
   4. Englert, Inc.
   5. McElroy Metal.
   6. Metal Roofing Systems, Inc.
   7. Petersen Aluminum Corporation.

2.2 ARCHITECTURAL METAL ROOF PANELS

A. Architectural Metal Roofing: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

B. Metal Panels: Factory-formed panels with factory-applied finish.
   1. Steel Panels:
      a. Zinc-coated steel conforming to ASTM A653/A653M; minimum G90 galvanizing.
      b. Steel Thickness: Minimum 24 gage (0.024 inch).
   2. Profile: Standing seam, with minimum 2.0 inch seam height; concealed fastener system lapped seam in standing seam profile.
   3. Texture: Smooth, with striations for added stiffness.
   4. Length: Full length of roof slope, without lapped horizontal joints.
   5. Width: Maximum panel coverage of 24 inches.
   6. Color: MBCI's Harbor Blue or manufacturer equivalent.

2.3 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard galvanized steel concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.4 FABRICATION

A. Panels: Provide factory or field fabricated panelswith two-coat flouropolymer finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.5 FINISHES

A. Fluoropolymer Coating System: Manufacturer's standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil; color and gloss as selected from manufacturer’s standards.

2.6 ROOF INSULATION

A. Extruded Polystyrene (XPS) Roof Insulation Board: Complies wtih ASTM C578, and manufactured using carbon black technology.
   1. Type and Compressive Resistance: Type IV, 25 psi, minimum.
   2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   3. Smoke Development Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   4. Type and Thermal Resistance, R-Value: Type IV, 5.0, minimum, per 1 inch thickness at 75 degrees F mean temperature.
   5. Board Size: In widths needed in relation to roof panel support with lengths not less than 96 inches.
   6. Board Thickness: 2 inches minimum..
   7. Board Edges: Square.
   8. Assembly: Stagger rigid foam joinst between layers so that vertical joints are not continuous from roof deck to roof panel.

2.7 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

C. Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

D. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 30 mil total thickness; with strippable release film and woven slip-resistant traction film top surface.
1. Sheet Thickness: 40 mil (0.040 inch) minimum total thickness.
2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
3. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
4. Water Vapor Permeance: 0.016 perm, maximum, when tested in accordance with ASTM D1970/D1970M.
5. Water Vapor Permeance: 0.05 perm, maximum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
6. Manufacturers:
   a. GCP Applied Technologies, Grace Ice & Water Shield.
   b. Henry Company; Blueskin PE200HT.
   c. Polyglass USA, Inc; Polystick MTS Self-Adhered High Temperature Roof Underlayment.

2.8 SNOW GUARDS

A. Snow Guards: Pre-fabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring. Snow guards shall be illustrated with the panel manufacturer' s installation drawings, and shall be designed to resist the sliding force of snow in accordance with the requirements of ASCE-7. Confirming calculations shall be provided by the panel manufacturer.
1. Basis of Design Product: Subject to compliance with requirements, provide Metal Roof Innovations, Ltd.; S-5! ColorGard or approved equal.
   a. Seam-Mounted, Bar-Type Snow Guards: Extruded Aluminum rods or bars held in place by aluminum clamps attached to vertical ribs of standing-seam metal roof panels.
   b. Finish: Milled.
   c. Color: Match roof panel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.
B. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
C. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.3 INSTALLATION

A. A certified installer must be on-site during all roofing installation activities.
B. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and

structural movement.

1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

C. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

D. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.

1. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

E. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches (90 mm).Roll laps with roller. Cover underlayment within Manufacturer's recommended time frame.

F. Snow Guards: Attach bar supports to vertical ribs of standing-seam metal roof panels with clamps or set screws. Do not use fasteners that will penetrate metal roof panels.

1. Provide 1 row of snow guards, at locations indicated on Drawings, spaced ¼” inch apart, beginning 2 feet up from gutter.

3.4 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.5 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 42 13 - METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured metal panels for exterior wall panels, interior liner panels, soffit panels, and subgirt framing assembly, with related flashings and accessory components.

1.2 SUBMITTALS

A. Product Data: For each type of product.
B. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.
C. Physical Samples: Submit one sample of wall panel and soffit panel, 12 inch by 12 inch in size illustrating finish color, sheen, and texture.
D. Sample Manufacturer's Warranty form.
E. Sample Panel Finish Warranty form.

1.3 CLOSEOUT SUBMITTALS

A. Owner's manual and maintenance data.
B. Manufacturer's Warranty form.
C. Panel Finish Warraty form.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum three years of documented experience.
C. Pre-Installation Conference: Conduct conference at project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing plastic shipping wrap.
B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
C. Prevent contact with materials that may cause discoloration, galvanization, or staining of products.

1.6 WARRANTY

A. Correct defective work within a twenty year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
B. Correct defective work within a five year period after Date of Substantial Completion, including defects in water tightness and integrity of seals for metal wall panels.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:
   1. Metal Wall Panels - Exposed Fasteners: 7.2 Panel manufactured by MBCI.
   2. Metal Soffit Panels: FW-120-1 with bead manufactured by MBCI.
B. Other Acceptable Manufacturers
   1. ATAS International, Inc.
   2. Berridge Manufacturing Company.
   3. Englert, Inc.
   4. McElroy Metal
   5. Petersen Aluminum Corporation.
   6. CENTRIA Architectural Systems.
   7. Metal Roofing Systems, Inc.

2.2 MANUFACTURED METAL PANELS

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
   1. Provide exterior panels, soffit panels, and subgirt framing assembly.

2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
3. Wind Loads: As indicated on Drawings.
4. Other Design Loads: As indicated on Drawings.
5. Maximum Allowable Deflection of Panel: L/180 for length(L) of span.
6. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
7. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
8. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
9. Corners: Factory-fabricated in one continuous piece.
10. Provide continuity of air barrier and vapor retarder seal at building enclosure elements.

B. Exterior Wall Panels:
1. Material: Precoated steel sheet, 24 gage.
2. Panel Width: 36".
3. Finish: Smooth.
4. Color: Tundra Gray.

C. Soffit Panels:
1. Material: Precoated steel sheet, 26 gage.
2. Color: Slate Gray.

D. Subgirt Framing Assembly:

E. Internal and External Corners: Same material, thickness, and finish as exterior sheets. Profile to suit system.

F. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

G. Anchors: Galvanized steel.

2.3 MATERIALS

A. Select materials with surface flatness, smoothness, and lack of surface blemishes where exposed to view in finished system.

2.4 FINISHES

A. Exposed Surface Finish: Panel manufacturer's standard polyvinylidene fluoride (PVDF) coating, top coat over manufacturer's standard primer complying with warranty.

2.5 ACCESSORIES

A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.

B. Concealed Sealants: Non-curing butyl sealant or tape sealant.

C. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane as reccomended and required by the manufacturer and complying with metal wall panel warranty.

D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.

E. Field Touch-up Paint: As recommended and required by panel manufacturer and complying with metal wall panel warranty.

F. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building framing members are ready to receive panels.

B. Verify that weather barrier has been installed over substrate completely and correctly.

3.2 PREPARATION

3.3 INSTALLATION

A. Install panels on walls and soffits in accordance with manufacturer's instructions.
B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
C. Fasten panels to structural supports; aligned, level, and plumb.
D. Locate joints over supports.
E. Lap panels a minimum of 2 inches while complying with manufacturer's installation requirements and reccomendations.
F. Provide expansion joints where indicated. If not indicated, coordinate joint location with Architect.
G. Seal and place gaskets to prevent weather penetration. Maintain neat finish appearance and functional weather penetration prevention.

3.4 TOLERANCES

A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

3.5 CLEANING

A. Remove site cuttings from finish surfaces.
B. Remove protective material from wall panel surfaces.
C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION

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SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.
B. Sealants for joints within sheet metal fabrications.

1.2 SUBMITTALS

A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
B. Closeout
   1. Maintenance data.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

1.4 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Finish Warranty Period: 20 years from date of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.1 SHEET MATERIALS

A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
   2. Color: As selected by Architect from manufacturer's full colors.
B. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gage, (0.0156 inch) thick; smooth No. 4 - Brushed finish.

2.2 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
B. Form pieces in longest possible lengths.
C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
G. Fabricate flashings to allow toe to extend 4" inches over roofing substrate. Return and brake edges.

2.3 GUTTER AND DOWNSPOUT FABRICATION

A. Gutters: SMACNA (ASMM) Rectangular profile.
B. Downspouts: Rectangular profile.
C. Gutters and Downspouts: Sizes as indicated on drawings.
D. Accessories: Profiled to suit gutters and downspouts.
   1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
   2. Gutter Supports: Straps.
   3. Downspout Supports: Brackets.

E. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3000 psi at 28 days, with minimum 5 percent air entrainment.
F. Downspout Boots: Steel.
G. Downspout Extenders: Same material and finish as downspouts.
H. Seal metal joints.

2.4 ACCESSORIES

A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
B. Primer: Zinc chromate type.
C. Concealed Sealants: Non-curing butyl sealant.
D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
E. Plastic Cement: ASTM D4586/D4586M, Type I.
F. Reglets: Surface mounted type, galvanized steel; face and ends covered with plastic tape.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.
B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.3 INSTALLATION

A. Insert flashings into reglets to form tight fit; secure in place with lead wedges; pack remaining spaces with lead wool; seal flashings into reglets with sealant.
B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted.
C. Apply plastic cement compound between metal flashings and felt flashings.
D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
E. Seal metal joints watertight.
F. Secure gutters and downspouts in place with concealed fasteners.
G. Slope gutters 1/8" inch per 10' feet, minimum.
H. Connect downspouts to downspout boots, and seal connection watertight.
I. Set splash pads under downspouts, roof and canopy drain outlets, and roof and canopy overflow outlets.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-sag gunnable joint sealants.
B. Self-leveling pourable joint sealants.
C. Joint backings and accessories.

1.2 SUBMITTALS

A. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   7. Sample product warranty.
B. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

1.4 WARRANTY

A. Correct defective work within a five year period after Date of Substantial Completion.
B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Openings below ledge angles in masonry.
      e. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.

a. Joints between door, window, and other frames and adjacent construction.
b. Other joints indicated below.

3. Do not seal the following types of joints.
a. Intentional weepholes in masonry.
b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
d. Joints where installation of sealant is specified in another section.
e. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
2. Lap Joints between Manufactured Metal Panels: Butyl rubber, non-curing.
3. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.

C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
3. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.
4. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
5. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
6. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
7. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.

D. Interior Wet Areas: Bathrooms, restrooms, kitchens, food service areas, and food processing areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

E. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.3 JOINT SEALANTS - GENERAL

A. Colors: As selected by Architect from manufacturer's standard color range.

2.4 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses NT; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
5. Color: To be selected by Architect from manufacturer's standard range.
6. Cure Type: Single-component, neutral moisture curing.
7. Service Temperature Range: minus 55 to 250 degrees F degrees F.
8. Basis of Design Product: Subject to compliance with requirements, provide Dow Corning Corporation 790 Silicone Building Sealant or comparable product by one of the following:
a. Dow Corning Corporation; 790 Silicone Building Sealant
b. Pecora Corporation
c. Sika Corporation; Sikasil WS-290.
d. Sika Corporation; Sikasil 728NS.

e. Tremco Commercial Sealants & Waterproofing; Spectrem 1
f. Tremco Commercial Sealants & Waterproofing; Tremsil 200.
g. GE Construction Sealants SCS2700 SilPruf LM.

B. Polyurethane Sealant: ASTM C920, Grade NS, Uses NT; single or multi-component; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 35 percent, minimum.
2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Basis of Design Product: Subject to compliance with requirements, provide BASF Corp. - Construction Chemicals; MasterSeal NP 1 or comparable product by one of the following:
a. Sika Corporation; Sikaflex-1a.
b. Sika Corporation; Sikaflex-15 LM.
c. Sika Corporation; Sikaflex-2c NS.
d. Tremco Commercial Sealants & Waterproofing; Dymeric 240 FC.
e. W. R. Meadows, Inc; POURTHANE NS.

C. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses A, M, T and NT; multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Basis of Design Product: Subject to compliance with requirements, provide BASF Corp. - Construction Chemicals; MasterSeal NP 2 or comparable product by one of the following:
a. Sika Corporation.
b. Pecora Corporation.

D. Non-Sag "Traffic-Grade" Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.
4. Service Temperature Range: Minus 40 to 180 degrees F.

E. Epoxy Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
1. Hardness Range: 65 to 75, Shore A, when tested in accordance with ASTM C661.
2. Color: To be selected by Architect from manufacturer's standard range.
3. Service Temperature Range: Minus 40 to 180 degrees F.

F. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Color: To be selected by Architect from manufacturer's standard range.
2. Grade: ASTM C834; Grade - Minus 18 Degrees C.
3. Manufacturers:
a. Hilti, Inc; CP 506 Smoke and Acoustical Sealant.
b. Hilti, Inc; CP 572 Smoke and Acoustical Spray Sealant.
c. Pecora Corporation.
d. Tremco Commercial Sealants & Waterproofing; Tremflex 834.
e. Tremco Commercial Sealants & Waterproofing; Tremstop Smoke & Sound.
f. Tremco Commercial Sealants & Waterproofing; Tremstop Smoke & Sound Spray

G. Butyl Sealant: Rubber-based; ASTM C1311; single component, nonsag; not expected to withstand continuous water immersion or traffic.
   1. Hardness Range: 10 to 30, Shore A, when tested in accordance with ASTM C661.
   2. Color: To be selected by Architect from manufacturer's standard range.
   3. Service Temperature Range: Minus 13 to 180 degrees F.
   4. Basis of Design Product: Subject to compliance with requirements, provide Pecora Corporation; BC-158 or comparable product by one of the following:
      a. Bostik, Inc.

2.5 SELF-LEVELING SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: Gray.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Manufacturers:
      a. Pecora Corporation.
      b. The QUIKRETE Companies; QUIKRETE® Polyurethane Self-Leveling Sealant
      c. Sika Corporation; Sikaflex-1c SL.
      d. Sika Corporation; Sikaflex-2c SL.

B. Self-Leveling Polyurethane Sealant for Horizontal Expansion Joints: ASTM C920, Grade P, Uses T, M and O; multi-component; explicitly approved by manufacturer for horizontal expansion joints.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 30 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Tensile Strength: 200 to 250 psi in accordance with ASTM D412.
   5. Manufacturers:
      a. Tremco Commercial Sealants & Waterproofing; THC-901.

C. Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
   1. Movement Capability: Plus and minus 25 percent, minimum.

D. Flexible Polyurethane Foam: Single-component, gun grade, and low-expanding.
   1. Manufacturers:
      a. DAP Products Inc; DRAFTSTOP 812 Foam.
      b. Tremco Commercial Sealants & Waterproofing; ExoAir Flex Foam.

E. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
   1. Composition: Multi-component, 100 percent solids by weight.
   2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
   3. Color: To be selected by Architect from manufacturer's standard colors.
   4. Joint Width, Minimum: 1/8 inch.
   5. Joint Width, Maximum: 1/4 inch.
   6. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
   7. Manufacturers:

a. Dayton Superior Corporation.
b. Euclid Chemical Company; EUCO 700.
c. Nox-Crete; DynaFlex 502.
d. W.R. Meadows, Inc; Rezi-Weld Flex.

2.6 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
2. Basis of Design Product: Subject to compliance with requirements, provide BASF Corp. - Construction Chemicals; MasterSeal 920 & 921 or comparable product by one of the following:
a. Nomaco, Inc.
b. Adfast Corporation..
c. Alcot Plastics, Ltd.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

END OF SECTION

SECTION 08 06 71 - DOOR HARDWARE SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Schedule of door hardware sets for swinging as indicated on drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Only manufacturers listed in Door Hardware Schedule or Section 08 71 00 are considered acceptable, unless noted otherwise.

B. Obtain each type of door hardware as indicated from a single manufacturer and single supplier.

C. Products are listed and certified compliant with specified standards by BHMA (CPD).

D. Manufacturer's Abbreviations: Coordinate with manufacturers listed in Section 08 71 00.

1. AA - Assa Abloy.
2. AR - Adams Rite.
3. BAS - Best Access Systems.
4. BOM - Bommer Industries.
5. CR - Corbin Russwin.
6. CRL - C. R. Laurence.
7. CUR - Curries.
8. DTX - Detex.
9. DMA - Dorma.
10. FC - Falcon.
11. FOR - Forms+Surfaces.
12. GJ - Glynn Johnson.
13. HGR - Hager.
14. HES - HES.
15. HG - Hettich Grant.
16. HIA - Hiawatha.
17. IVE - Ives.
18. JOH - Johnson Hardware.
19. KNX - Knox Company.
20. LCN - LCN.
21. McK - McKinney.
22. MED - Medeco.
23. MKR - Markar.
24. NGP - National Guard Products.
25. NOR - Norton.
26. PEM - Pemko.
27. PH - Precision Hardware.
28. RIX - Rixson.
29. ROC - Rockwood.
30. SA - Sargent.
31. SCH - Schlage.
32. SEC - Securitron.
33. SDC - Stanley Door Closers.
34. SH - Stanley Hinges.
35. STH - Stanley Commercial Hardware.
36. TR - Trimco.
37. VD - Von Duprin.
38. YA - Yale.
39. ZRO - Zero Industries, Inc.

2.2 DESCRIPTION

A. Door hardware sets provided represent the design intent, they are only a guideline and should not be considered a detailed or complete hardware schedule.
   1. Provide door hardware item(s) as required for similar purposes, even when item is not listed for a door in Door Hardware Schedule.
   2. Necessary items that are not included in a Hardware Set should be added and have the appropriate additional hardware as required for proper application and functionality.
   3. Door hardware supplier is responsible for providing proper size and hand of door for products required in accordance with Door Hardware Schedule and as indicated on drawings.
   4. Quantities listed are for each Pair (PR) of doors, or for each Single (SGL) door, as indicated in hardware sets.

2.3 FINISHES

A. Finishes: Complying with BHMA A156.18.
   1. Code 626: Satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D).

PART 3 EXECUTION

3.1 DOOR HARDWARE SCHEDULE

A. Organize listing of door hardware components within each hardware set in compliance with 10-Part scheduling sequence indicated in DHI (H&S), unless otherwise indicated.

3.2 HARDWARE SET # 1: Exterior double aluminum frame vestibule door with ADA operator and access control

A. For use on Door Number(s): 100-1.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
2	Continuous Hinge	CFMCHD		PEM
2	Exit Device	7100MELR x 627F	626	YA
1	Keyed Removable Mullion	KRM200		YA
1	Door Operator	5730	689	NOR
1	Closer	PA51P	626	YA
1	Threshold	158A		PEM
2	Sweep	18061CNB		PEM
Perimeter	Gasketing	By Storefront Manufacturer		
1	Switch Post - RF Transmitter	530		NOR
1	Push Switch	971		NOR

C. Coordinate with access control installation. Power supply to door operator to be controlled by dry relay controlled by access control system.

3.3 HARDWARE SET # 2: Exterior double aluminum frame vestibule door with access control

A. For use on Door Number(s): 100-2.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
2	Continuous Hinge	CFMCHD		PEM
2	Exit Device	7100MELR x 627F	626	YA
1	Keyed Removable Mullion	KRM200		YA
2	Closer	PA51P	626	YA
As Needed	Drop Plate	As Needed	626	YA
1	Threshold	158A		PEM
2	Sweep	18061CNB		PEM

Perimeter	Gasketing	By Storefront Manufacturer		

C. Coordinate with access control installation.

3.4 HARDWARE SET # 3: Interior double aluminum frame vestibule door with ADA operator

A. For use on Door Number(s): 100-3.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
2	Continuous Hinge	CFMCHD		PEM
2	Push-Pull Bar	BF15747	626	RO
1	Door Operator	5730	689	NOR
1	Closer	PA51P	626	YA
Perimeter	Gasketing	By Storefront Manufacturer		
1	Power Supply	782 BPSM-24-X		SEC
2	Push Switch	971		NOR

C. Coordinate with access control installation.

3.5 HARDWARE SET # 4: Interior double aluminum frame vestibule door

A. For use on Door Number(s): 100-4.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
2	Continuous Hinge	CFMCHD		PEM
2	Push-Pull Bar	BF15747	626	RO
2	Closer	PA51P	626	YA
As Needed	Drop Plate	As Needed	626	YA
Perimeter	Gasketing	By Storefront Manufacturer		

3.6 HARDWARE SET # 5: Interior double aluminum frame door with ADA operator and access control

A. For use on Door Number(s): 100-6.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
2	Continuous Hinge	CFMCHD		PEM
2	Exit Device	7100MELR x 627F	626	YA
1	Keyed Removable Mullion	KRM200		YA
1	Door Operator	5730	689	NOR
1	Closer	PA51P	626	YA
Perimeter	Gasketing	By Storefront Manufacturer		
2	Push Switch	971		NOR

C. Coordinate with access control installation. Power supply to door operator to be controlled by dry relay controlled by access control system.

3.7 HARDWARE SET # 6: Interior double aluminum frame door with access control

A. For use on Door Number(s): 100-6.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
2	Continuous Hinge	CFMCHD		PEM
2	Exit Device	7100MELR x 627F	626	YA
1	Keyed Removable Mullion	KRM200		YA
2	Closer	PA51P	626	YA
As Needed	Drop Plate	As Needed	626	YA

Perimeter	Gasketing	By Storefront Manufacturer		

3.8 HARDWARE SET # 7: Exterior single hollow metal egress door

A. For use on Door Number(s): 101-1, 102-2, 102-3, 113-6, 117-1.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	Hinge	TCA2714 x SSF - 4.5x4.5	626	MCK
1	Mortise Lock	AU x CN x 8805	626	YA
1	Closer	PA4400M	626	YA
1	Kick Plate - Push Side	K1050	626	RO
1	Threshold	158A		PEM
Perimeter	Gasketing	297AV		PEM
1	Stand-Alone Door Alarm	SDA 16	626	YA

3.9 HARDWARE SET # 8: Exterior oversized single mechanical room door

A. For use on Door Number(s): 120-2.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
1	Continuous Hinge	CFMCHD		PEM
1	Mortise Lock	AU x CN x 8805	626	YA
1	Closer	PA4410	626	YA
1	Armor Plate - Push Side	K1050A-6	626	RO
1	Threshold	158A		PEM
Perimeter	Gasketing	297AV		PEM

3.10 HARDWARE SET # 9: Exterior single hollow metal door with access control and card reader

A. For use on Door Number(s): 108-1.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
1	Continuous Hinge	CFMCHD		PEM
1	Mortise Lock	AU x CN x 8891	626	YA
1	Closer	PA4400-M	626	YA
1	Armor Plate - Push Side	K1050A-6	626	RO
1	Threshold	158A		PEM
Perimeter	Gasketing	297AV		PEM

C. Coordinate with access control installation and with card reader installation.

3.11 HARDWARE SET # 10: Exterior single aluminum frame patio door with access control

A. For use on Door Number(s): 112-1.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
1	Continuous Hinge	CFMCHD		PEM
1	Mortise Lock	AU x CN x 8891	626	YA
1	Closer	PA51P	626	YA
1	Floor Stop	466-RKM		RO
1	Threshold	158A		PEM
Perimeter	Gasketing	Per Storefront Manufacturer		

3.12 HARDWARE SET # 11: Exterior double aluminum frame patio door with access control

A. For use on Door Number(s): 113-2.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
2	Continuous Hinge	CFMCHD		PEM
2	Mortise Lock	AU x CN x 8891	626	YA
2	Keyed Removable Mullion	KRM200		YA
2	Closer	PA51P	626	YA
As Needed	Drop Plate	As Needed	626	
1	Threshold	158A		PEM
2	Sweep	18061CNB		PEM
Perimeter	Gasketing	Per Storefront Manufacturer		

3.13 HARDWARE SET # 12: Exterior double hollow metal mechanical room door

A. For use on Door Number(s): 114-2.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
6	Hinge	TCA2714 x SSF - 4.5x4.5	626	MCK
1	Surface Vertical Rod	1810 x 217F	626	YA
1	Flush Bolt	550	626	RO
1	Dust Proof Strike	570	626	RO
1	Closer	PA4410	626	YA
1	Armor Plate - Push Side	K1050A-6	626	RO
1	Drip Cap	346D		PEM
1	Threshold	158A		PEM
Perimeter	Gasketing	297AV		PEM

3.14 HARDWARE SET # 13: Interior public restroom door

A. For use on Door Number(s): 105-1, 107-1.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	Hinge	TCA2714 - 4.5x4.5	626	MCK
1	Pull Bar	BF151	626	RO
1	Push Plate	70RCE	626	RO
1	Closer	PA4400-M	626	YA
1	Kick Plate - Push Side	K1050	626	RO

3.15 HARDWARE SET # 14: Interior single hollow metal janitor's closet door

A. For use on Door Number(s): 106-1.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	Hinge	TCA2714 - 4.5x4.5	626	MCK
1	Latchset	4705LN	626	YA
1	Kick Plate - Push Side	K1050	626	RO

3.16 HARDWARE SET # 15: Interior double hollow metal door

A. For use on Door Number(s): 102-1, 102-4, 104-1, 120-3.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
6	Hinge	TCA2714 - 4.5x4.5	626	MCK
2	Surface Vertical Rod	6175 x AU x 426F	626	YA
2	Floor Stops	466-RKW		RO

2	Kick Plate - Push Side	K1050	626	RO

3.17 HARDWARE SET # 16: Interior single adult restroom door

A. For use on Door Number(s): 119-1, 128-1, 129-1.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	Hinge	TCA2714 - 4.5x4.5	626	MCK
1	Mortise Lock	AU x CN x 8864FL x CIND	626	YA
1	Closer	PA4400-M	626	YA
1	Kick Plate - Push Side	K1050	626	RO

3.18 HARDWARE SET # 17: Interior double aluminum frame children's area door

A. For use on Door Number(s): 113-1.

B. Provide for each Pair (PR) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
2	Continuous Hinge	CFMCHD		PEM
2	Push-Pull Bar	BF15747	626	RO
2	Closer	PA51P	626	YA
2	Stop Fingerguard	7012F		AA

3.19 HARDWARE SET # 18: Interior single hollow metal mechanical room door

A. For use on Door Number(s): 114-1, 120-1.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	Hinge	TCA2714 - 4.5x4.5	626	MCK
1	Latchset	4705LN	626	YA
1	Closer	PA4400-M	626	YA
1	Kick Plate - Push Side	K1050	626	RO

3.20 HARDWARE SET # 19: Interior single hollow metal storage room door

A. For use on Door Number(s): 113-3, 113-5.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	Hinge	TCA2714 - 4.5x4.5	626	MCK
1	Latchset	4705LN	626	YA
1	Closer	PA4400-M	626	YA
1	Kick Plate - Push Side	K1050	626	RO
Perimeter	Gasketing	297AV		PEM

3.21 HARDWARE SET # 20: Interior single child restroom door

A. For use on Door Number(s): 130-1.

B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
1	Continuous Hinge	CFMCHD		PEM
1	Mortise Lock	AU x CN x 8864FL x CIND	626	YA
1	Closer	PA4400-M	626	YA
1	Kick Plate - Push Side	K1050	626	RO
1	Stop Fingerguard	7012F		AA

3.22 HARDWARE SET # 21: Interior single hollow metal workroom door with access control and card reader

A. For use on Door Number(s): 118-1, 118-2.
B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	Hinge	TCA2714 - 4.5x4.5	626	MCK
1	Mortise Lock	AU x CN x 8891	626	YA
1	Closer	PA4400-M	626	YA
1	Armor Plate - Push Side	K1050A-6	626	RO

3.23 HARDWARE SET # 22: Interior single hollow metal office door

A. For use on Door Number(s): 122-1.
B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	Hinge	TCA2714 - 4.5x4.5	626	MCK
1	Latchset	AU x 4722LN	626	YA
1	Closer	PA4400-M	626	YA
1	Kick Plate - Push Side	K1050	626	RO

3.24 HARDWARE SET # 23: Interior single hollow metal breakroom door

A. For use on Door Number(s): 121-1.
B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
3	Hinge	TCA2714 - 4.5x4.5	626	MCK
1	Latchset	AU x 4701LN	626	YA
1	Closer	PA4400-M	626	YA
1	Kick Plate - Push Side	K1050	626	RO
Perimeter	Gasketing	297AV		PEM

3.25 HARDWARE SET # 24: Interior single aluminum frame study room door

A. For use on Door Number(s): 123-1, 124-1, 125-1, 126-1, 127-1.
B. Provide for each Single (SGL) door(s).

UNITS	ITEM	DESCRIPTION	FINISH	MFR
1	Continuous Hinge	CFMCHD		PEM
1	Latchset	AU x CN x 8805	626	YA
1	Closer	PA51P	626	YA
1	Floor Stop	466-RKW		RO
Perimeter	Gasketing	By Storefront Manufacturer		

END OF SECTION

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SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.
B. Fire-rated hollow metal doors and frames.

1.2 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anhorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation
B. Coordinate requirements for installation of door hardware, electricified door hardware, and access control and security systems.

1.3 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on the Drawings. Coordiante with final door hardware schedule.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project site storage. Do not use nonvented plastic.
    1. Provide additional protection to prevent damage to factory-finished units.
B. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
C. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.
D. Deliver welded frames with two removeable spreader bars across the bottom of frames, tack welded to jambs and mullions.
E. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Hollow Metal Doors and Frames: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    1. Ceco Door, an Assa Abloy Group company.
    2. Curries, an Assa Abloy Group company.
    3. Fleming Door Products, an Assa Abloy Group company.
    4. Mesker, dormakaba Group.
    5. Republic Doors, an Allegion brand.
    6. Steelcraft, an Allegion brand.

2.2 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
B. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
E. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ATM E 136 for combustion characteristics.
F. Accessibility: Comply with ICC A117.1 and ADA Standards.
G. Fire-Rated Assemblies: Comply with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicted, based on testing at positive pressure according to NFPA 252 or UL 10C.
H. Door Edge Profile: Manufacturers standard for application indicated.
I. Typical Door Face Sheets: Flush.
J. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Mitered hairline joints.
    1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
K. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
L. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.38 deg Btu/F x h x sq. ft. when tested according to ASTM C 518.
M. Construct hollow-metal doors and frames to comply with standards indictated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
N. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.
B. Exterior Doors: Thermally insulated.
    1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
        a. Level 3 - Extra Heavy-duty.
        b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
        c. Model 1 - Full Flush.
        d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
        e. Zinc Coating: A 40 /ZF 120 galvannealed coating; ASTM A653/A653M.
    2. Door Core Material: Polyisocyanurate, 2 lbs/cu ft minimum density.
        a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
    3. Door Thermal Resistance: R-Value of 9.9, minimum, for installed thickness of polyisocyanurate.
    4. Door Thickness: 1-3/4 inch, nominal.
    5. Top Closures: Flush with top of faces and edges.
    6. Door Face Sheets: Flush.

7. Weatherstripping: Refer to Section 08 71 00.
8. Door Type & Finish: As indicated in Door and Frame Schedule.

C. Interior Doors, Non-Fire Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 2 - Heavy-duty.
b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
3. Door Thickness: 1-3/4 inch, nominal.
4. Door Face Sheets: Flush.
5. Door Type & Finish: As indicated in Door and Frame Schedule.

D. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 2 - Heavy-duty.
b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
2. Fire Rating: As indicated on drawings, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
3. Provide units listed and labeled by UL (DIR).
a. Attach fire rating label to each fire rated unit.
4. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
5. Door Thickness: 1-3/4 inch, nominal.
6. Door Face Sheets: Flush.
7. Door Type & Finish: As indicated in Door and Frame Schedule.

2.4 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished indicated in Drawings.

C. Exterior Door Frames: Full profile/continuously welded type.
1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
3. Weatherstripping: Separate, see Section 08 71 00.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

E. Door Frames, Fire-Rated: Full profile/continuously welded type.
1. Fire Rating: Same as door, labeled.
2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

F. Tornado-Resistant Door Frames: With same tornado resistance as door; face welded or full profile/continuously welded construction, ground smooth, fully prepared and reinforced for hardware installation.
1. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
2. Frame Finish: Factory primed and field finished.

G. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
H. Mullions for Pairs of Doors: Removable type, with profile similar to jambs.
I. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
J. Transom Bars: Fixed, of profile same as jamb and head.
K. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
L. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.

2.5 FRAME ANCHORS

A. Frame Anchors: ASTM A879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet comply with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.
B. Jamb Anchors:
   1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
   2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24-inches of frame height above 7-feet.
   3. Post-installed Expansion Anchor: Minimum 3/8-inch diameter bolts with expansion shield or inserts, with manufacturer's standard pipe spacer.
C. Floor Anchors: Provide floor anchors for each jamb and mullion that extend to floor.

2.6 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.7 ACCESSORIES

A. Glazing: As specified in Section 08 80 00, factory installed.
B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
C. Astragals for Double Doors: Specified in Section 08 7100.
D. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.
E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
F. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.
C. Verify that finished walls are in plane to ensure proper door alignment.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restor exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
B. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.
C. Drill and tap doors and frames to receive mortised and surface-mounted door hardware.

3.3 INSTALLATION

A. Install doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
B. Install fire rated units in accordance with NFPA 80.
C. Coordinate frame anchor placement with wall construction.
D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
E. Install door hardware as specified in Section 08 71 00.
F. Comply with glazing installation requirements of Section 08 80 00.
G. Coordinate installation of electrical connections to electrical hardware items.
H. Touch up damaged factory finishes.

3.4 TOLERANCES

A. Hollow-Metal Frames:
   1. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.
   2. Squareness: Plus or minus 1/16-inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   3. Alignment: Plus or minus 1/16-inch, measured at jambs on a horizontal line parallel to plane of wall.
   4. Plumbness: Plus or minus 1/16-inch, measured at jambs at floor.
B. Hollow-Metal Doors:
   1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8 or NAAMM-HMMA 841 and NAAMM-HMMA guide specification indicated.
   2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3.5 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.6 CLEANING AND TOUCH-UP

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flush wood doors; flushand flush glazed configuration; fire-rated and non-rated.

1.2 SUBMITTALS

A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

C. Samples: For factory-finished veneers.

1.3 CLOSEOUT SUBMITTALS

A. Owner's Manual and Maintenance Data.

B. Manufacturer's Warranty Form.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging, and inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

D. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

1.5 WARRANTY

A. Interior Doors: Provide manufacturer's warranty for the life of the installation.

1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide product indicated in Drawings; or a comparable product by one of the following:

1. Eggers Industries.
2. Graham Wood Doors.
3. Marshfield DoorSystems, Inc.
4. VT Industries.
5. OshKosh Door Company.

2.2 DOORS

A. Doors: See drawings for locations and additional requirements.

1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with WDMA I.S. 1A.
2. Wood Veneer Faced Doors: 5-ply or 7-ply.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.

1. Provide solid core doors at each location.
2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) labeledwithout any visible seals when door is closed.
3. Wood veneer facing with factory transparent finishas indicated on drawings.

2.3 DOOR CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.4 DOOR FACINGS

A. Veneer Facing for Transparent Finish: As indicated in Drawings, HPVA Grade A, plain sliced (flat cut), with book match between leaves of veneer, balance match of spliced veneer leaves assembled on door or panel face; unless otherwise indicated.
   1. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.
   2. Transoms: Continuous match to doors.

2.5 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.
B. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
E. Provide edge clearances in accordance with the quality standard specified.

2.6 FINISHES - WOOD VENEER DOORS

A. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
   1. Transparent:
      a. System - TR-6, Catalyzed Polyurethane.
      b. Stain: As indicated on Drawings.
      c. Sheen: Satin.
      d. Grade: Premium.
      e. Effect: Open-grain finish.
B. Factory finish doors in accordance with approved sample.

2.7 ACCESSORIES

A. Hollow Metal Door Frames: See Section 08 11 13.
B. Glazing: See Section 08 80 00.
C. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink styletamper proof screws.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that opening sizes and tolerances are acceptable.
C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.
D. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and hav been installed with level heads and plumb jambs.
E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.
B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
C. Use machine tools to cut or drill for hardware.
D. Coordinate installation of doors with installation of frames and hardware.
E. Coordinate installation of glazing.

3.3 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.
B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.4 ADJUSTING

A. Adjust doors for smooth and balanced door movement.
B. Adjust closers for full closure.
C. Replace doors that are damaged or that do not comply with requirements. Doors may be repaired ar refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

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SECTION 08 43 13 - ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.
B. Aluminum-framed storefront, with operable panels.
C. Aluminum doors and frames.
D. Weatherstripping.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.
B. Pre-Installation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.3 SUBMITTALS

A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
C. Samples: Submit one sample 12 by 12 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.
B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.6 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.7 WARRANTY

A. Provide 10 year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
    1. Failure include, but are not limited to, the following:
    2. Structural failures, including but not limited to, excessive deflection.
    3. Noise or vibration created by wind and thermal and structural movements
    4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    5. Water penetration through fixed glazing and framing areas.
    6. Failure of operating components.
B. Provide 20 year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.
    1. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
        a. Deterioration includes, but is not limited to, the following:
            1) Color fading more than 5 Hunter units when tested according to ASTM D 2244.

2) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
3) Cracking, checking, peeling, or failure of paint to adhere to bare metal.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING - EXTERIOR

A. Center-Set Style, Thermally-Broken:
1. Basis of Design: Subject to compliance with requirements, provide EFCO Corporation; Series 403, Thermal Storefront Framing or a comparable product by one of the following:
a. Kawneer North America; an Alcoa company.
b. Manko Window Systems, Inc.
c. Vistawall Architectural Products.

2.2 BASIS OF DESIGN -- FRAMING FOR MONOLITHIC GLAZING - INTERIOR

A. Center-Set Style:
1. Basis of Design: Subject to compliance with requirements, provide EFCO Corporation; Series 401, Non-Thermal Storefront Framing or a comparable product by one of the following:
a. Kawneer North America; an Alcoa company.
b. Manko Window Systems, Inc.
c. Vistawall Architectural Products.

2.3 BASIS OF DESIGN -- SWINGING DOORS

A. Wide Stile, Insulating Glazing, Thermally-Broken:
1. Basis of Design: Subject to compliance with requirements, provide EFCO Corporation; Series D502 Thermastile or a comparable product by one of the following:
a. Kawneer North America; an Alcoa company.
b. Manko Window Systems, Inc.
c. Vistawall Architectural Products.

2.4 ALUMINUM-FRAMED STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
1. Finish: Class I natural anodized.
a. Factory finish all surfaces that will be exposed in completed assemblies.
2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
3. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
4. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
5. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
6. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
7. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
8. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.

B. Performance Requirements:
   1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
      a. Design Wind Loads: Comply with requirements of ASCE 7.
      b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
   2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 12 psf.
   3. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.
   4. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.

2.5 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
   1. Glazing Stops: Flush.
   2. Cross-Section: As indicated on drawings.
B. Glazing: As specified in Section 08 80 00.
C. Infill Panels: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
   1. Finish: Same as storefront.
D. Swing Doors: Glazed aluminum.
   1. Bottom Rail: 10 inches wide.
   2. Glazing Stops: Square.
   3. Finish: Same as storefront.

2.6 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).
B. Sheet Aluminum: ASTM B209 (ASTM B209M).
C. Fasteners: Stainless steel.
D. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.
E. Concealed Flashings: Stainless steel, 26 gage, 0.0187 inch minimum thickness.
F. Concealed Flashings: Sheet aluminum, 26 gage, 0.017 inch minimum thickness.
G. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
H. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
I. Glazing Accessories: As specified in Section 08 80 00.

2.7 FINISHES

A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.8 HARDWARE

A. For each door, include weatherstripping.
B. For operable panels include cam locks at top and bottom of frame.
C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.
B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
C. Provide alignment attachments and shims to permanently fasten system to building structure.
D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
E. Provide thermal isolation where components penetrate or disrupt building insulation.
F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
I. Set thresholds in bed of sealant and secure.
J. Install hardware using templates provided.
K. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.5 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.
B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.
C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.6 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 71 00 - DOOR HARDWARE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Hardware for wood, aluminum, and hollow metal doors.
B. Electrically operated and controlled hardware.
C. Thresholds.
D. Weatherstripping and gasketing.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; attendance is required by affected installers and the following:
    1. Hardware Installer.
D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
E. Keying Requirements Meeting:
    1. Attendance Required:
        a. CMr.
        b. Owner.
        c. Architect.
        d. Hardware Installer.
        e. Owner's Security Consultant.
    2. Agenda:
        a. Establish keying requirements.
        b. Verify locksets and locking hardware are functionally correct for project requirements.
        c. Verify that keying and programming complies with project requirements.
        d. Establish keying submittal schedule and update requirements.
    3. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
        a. Access control requirements.
        b. Key control system requirements.
        c. Schematic diagram of preliminary key system.
        d. Flow of traffic and extent of security required.
    4. Record minutes and distribute copies within two days after meeting to participants on the project website..
    5. Deliver established keying requirements to manufacturers.

1.3 SUBMITTALS

A. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
B. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
C. Keying Schedule:
    1. Submit completed Keying Schedule in compliance with requirements established during Keying Requirements Meeting to the project website.
D. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

E. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
F. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
   1. Lock Cylinders: Ten for each master keyed group.
   2. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience and approved by manufacturer.
C. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) to assist in work of this section.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.6 WARRANTY

A. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
   1. Closers: Five years, minimum.
   2. Exit Devices: Three years, minimum.
   3. Locksets and Cylinders: Three years, minimum.
   4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
B. Provide individual items of single type, of same model, and by same manufacturer.
C. Provide door hardware products that comply with the following requirements:
   1. Applicable provisions of federal, state, and local codes.
   2. Accessibility: ADA Standards and ICC A117.1.
   3. Applicable provisions of NFPA 101.
   4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
   5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.
   6. Listed and certified compliant with specified standards by BHMA (CPD).
   7. Auxiliary Hardware: BHMA A156.16.
   8. Straps and Tee Hinges: BHMA A156.20.
   9. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
   10. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
   11. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.
D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.

E. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. Refer to Section 08 0671 for listing of hardware sets.

F. Fasteners:
   1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
      a. Aluminum fasteners are not permitted.
      b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
   2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
      a. Self-drilling (Tek) type screws are not permitted.
   3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
   4. Provide wall grip inserts for hollow wall construction.
   5. Provide spacers or sex bolts with sleeves for through bolting of hollow metal doors and frames.
   6. Fire-Rated Applications: Comply with NFPA 80.
      a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
      b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.
   7. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated.

2.2 HINGES

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. McKinney; an Assa Abloy Group company.
   2. Bommer Industries, InC.
   3. C. R. Laurence Co., Inc.
   4. Hager Companies.
   5. Stanley, dormakaba Group.
   6. Ives, an Allegion brand.

B. Hinges: Comply with BHMA A156.1, Grade 1.
   1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
      a. Provide hinge width required to clear surrounding trim.
   2. Continuous Hinges: Comply with BHMA A156.26.
   3. Provide hinges on every swinging door.
   4. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
   5. Provide ball-bearing hinges at each door with closer.
   6. Provide non-removable pins on exterior outswinging doors.
   7. Provide non-removable pins on interior outswinging doors at locations as indicated.
   8. Provide power transfer hinges where electrified hardware is mounted in door leaf.
   9. Provide following quantity of butt hinges for each door:
      a. Doors up to 60 inches High: Two hinges.
      b. Doors From 60 inches High up to 90 inches High: Three hinges.

2.3 FLUSH BOLTS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Adams Rite, an Assa Abloy Group company.
   2. Hager Companies.
   3. Ives, an Allegion brand.

4. Rockwood, an Assa Abloy company.

B. Flush Bolts: Comply with BHMA A156.16, Grade 1.
   1. Flush Bolt Throw: 3/4 inch, minimum.
   2. Provides extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
      a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
   3. Provide dustproof floor strike for bolt into floor, except at metal thresholds.

2.4 EXIT DEVICES

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Corbin Russwin, Sargent, or Yale; Assa Abloy Group companies
   2. C. R. Laurence Company, Inc.
   3. DORMA USA, Inc.
   4. Hager Companies.
   5. Stanley, dormakaba Group.
   6. Von Duprin, an Allegion brand.

B. Exit Devices: Comply with BHMA A156.3, Grade 1.
   1. Lever design to match lockset trim.
   2. Provide cylinder with cylinder dogging or locking trim.
   3. Provide exit devices properly sized for door width and height.
   4. Provide strike as recommended by manufacturer for application indicated.
   5. Provide less bottom rod (LBR) at scheduled locations to eliminate use of floor mounted strikes.
   6. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.
   7. For electrical options, provide quick connect plug-in pre-wired connectors.

2.5 ELECTRIC STRIKES

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Adams Rite, HES, or Securitron; Assa Abloy Group companies.
   2. Von Duprin, an Allegion brand.

B. Electric Strikes: Comply with BHMA A156.31, Grade 1.
   1. Provide UL (DIR) listed burglary-resistant electric strike; style to suit locks.
   2. Provide non-handed 24 VDC electric strike suitable for door frame material and scheduled lock configuration.
   3. Provide transformer and rectifier as necessary for complete installation.
   4. Connect electric strikes into fire alarm where non-rated doors are scheduled to release with fire or sprinkler alarm condition.

2.6 LOCK CYLINDERS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Best, dormakaba Group.
   2. Schlage, an Allegion brand.
   3. Yale; an Assa Abloy Group company.

B. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
   1. Provide standard, electronic, conventional, full size interchangeable core (FSIC), and small format interchangeable core (SFIC) type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
   2. Provide cylinders from same manufacturer as locking device.

3. Provide cams and/or tailpieces as required for locking devices.

2.7 CYLINDRICAL LOCKS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Corbin Russwin, Sargent, or Yale; Assa Abloy Group companies.
   2. Schlage, an Allegion brand.
   3. Stanley, dormakaba Group.

B. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
   1. Bored Hole: 2-1/8 inch diameter.
   2. Latchbolt Throw: 1/2 inch, minimum.
   3. Backset: 2-3/4 inch unless otherwise indicated.
   4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
      a. Finish: To match lock or latch.
      b. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.
      c. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.
      d. Rabbet Front and Strike: Provide on locksets for use with rabbeted meeting rails.
   5. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.

2.8 MORTISE LOCKS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Corbin Russwin, Sargent, or Yale; Assa Abloy Group companies.
   2. Schlage, an Allegion brand.
   3. Stanley, dormakaba Group.

B. Mortise Locks: Comply with BHMA A156.13, Grade 1, Security, 1000 Series.
   1. Latchbolt Throw: 3/4 inch, minimum.
   2. Deadbolt Throw: 1 inch, minimum.
   3. Backset: 2-3/4 inch unless otherwise indicated.
   4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
      a. Flat-Lip Strikes: Provide for locks with three piece antifriction latchbolts as recommended by manufacturer.
      b. Aluminum-Frame Strike Box: Provide strike box fabricated for use with aluminum framing by framing manufacturer.
      c. Rabbet Front and Strike: Provide on locksets for use with rabbeted meeting rails.
      d. Finish: To match lock or latch.

2.9 ELECTROMECHANICAL LOCKS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Sargent or Yale; Assa Abloy Group companies.
   2. Schlage, an Allegion brand.

B. Electromechanical Locks: Comply with BHMA A156.25, Grade 1.
   1. Provide motor-driven or solenoid-driven locks, with strike that is applicable to frame.
   2. Type: Mortise deadbolt.

2.10 DOOR PULLS AND PUSH PLATES

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:

1. Rockwood; an Assa Abloy Group company.
2. Hiawatha, Inc, division of Activar Construction Products Group, Inc.
3. Trimco.
4. Ives an Allegion Brand.

B. Door Pulls and Push Plates: Comply with BHMA A156.6.
1. Pull Type: Straight, unless otherwise indicated.
2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
a. Edges: Beveled, unless otherwise indicated.
3. Material: Aluminum, unless otherwise indicated.
4. On solid doors, provide matching door pull and push plate on opposite faces.
5. On glazed storefront doors, provide matching door pulls/push plates on both faces unless otherwise indicated.

2.11 DOOR PULLS AND PUSH BARS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
1. Rockwood; an Assa Abloy Group company.
2. Hiawatha, Inc, division of Activar Construction Products Group, Inc.
3. Trimco.
4. [Ives, an Allegion brand; <> : www.allegion.com/us.]Ives, an Allegion brand.

B. Door Pulls and Push Bars: Comply with BHMA A156.6.
1. Bar Type: Bar set, unless otherwise indicated.
2. Material: Aluminum, unless otherwise indicated.

2.12 CLOSERS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following: Surface Mounted:
1. Corbin Russwin, Norton, Rixson, Sargent, or Yale; Assa Abloy Group companies.
2. C. R. Laurence Company, Inc.
3. LCN, an Allegion brand.
4. Stanley, dormakaba Group.

B. Closers: Comply with BHMA A156.4, Grade 1.
1. Type: Surface mounted to door.
2. Provide door closer on each exterior door.
3. Provide door closer on each fire-rated and smoke-rated door.
a. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.
4. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.
5. At corridor entry doors, mount closer on room side of door.
6. At outswinging exterior doors, mount closer on interior side of door.

2.13 PROTECTION PLATES

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
1. Rockwood; an Assa Abloy Group company.
2. C. R. Laurence Company, Inc
3. Hiawatha, Inc, an Activar Construction Products Group company.
4. Ives, an Allegion brand.
5. Trimco.

B. Protection Plates: Comply with BHMA A156.6.

2.14 ARMOR PLATES

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Hiawatha, Inc, an Activar Construction Products Group company.
   2. Ives, an Allegion brand.
   3. Trimco.
   4. Rockwood, an Assa Abloy Group company.

B. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.

2.15 KICK PLATES

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Hiawatha, Inc, an Activar Construction Products Group company.
   2. Ives, an Allegion brand.
   3. Trimco.
   4. Rockwood, an Assa Abloy company.

2.16 FLOOR STOPS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Rockwood; an Assa Abloy Group company.
   2. Hiawatha, Inc, division of Activar Construction Products Group, Inc.
   3. Trimco.
   4. Ives, an Allegion brand.

B. Floor Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
   1. Provide floor stops when wall surface is not available; be cautious not to create a tripping hazard.
   2. Type: Manual hold-open, with pencil floor stop.
   3. Material: Aluminum housing with rubber insert.

2.17 ASTRAGALS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Pemko; an Assa Abloy Group company.
   2. Zero International, Inc.

B. Astragals: Comply with BHMA A156.22.
   1. Provide surface mounted astragal to cover or fill space for full door height between pair of doors or door and adjacent jamb.
   2. Type: Split, two parts, and with sealing gasket.
   3. Material: Aluminum, with neoprene weatherstripping.
   4. Provide non-corroding fasteners at exterior locations.

2.18 THRESHOLDS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Pemko; an Assa Abloy Group company.
   2. Zero International, Inc.

B. Thresholds: Comply with BHMA A156.21.
   1. Provide threshold at each exterior door, unless otherwise indicated.
   2. Field cut threshold to profile of frame and width of door sill for tight fit.
   3. Provide non-corroding fasteners at exterior locations.

2.19 WEATHERSTRIPPING AND GASKETING

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Pemko; an Assa Abloy Group company.
   2. Zero International, Inc.
B. Weatherstripping and Gasketing: Comply with BHMA A156.22.
   1. Door Sweep Type: Encased in retainer.
   2. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated; .
   3. Provide door bottom sweep on each exterior door, unless otherwise indicated.

2.20 SILENCERS

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Ives, an Allegion brand.
   2. Rockwood; an Assa Abloy Group company.
B. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
   1. Single Door: Provide three on strike jamb of frame.
   2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
   3. Material: Rubber, gray color.

2.21 FIRE DEPARTMENT LOCK BOX

A. Fire Department Lock Box:
   1. Heavy-duty, surface mounted, solid stainless-steel box with hinged door and interior gasket seal; single drill resistant lock with dust covers and tamper alarm.
   2. Capacity: Holds2 keys.
   3. Finish: Manufacturer's standard dark bronze.

2.22 POWER SUPPLY

A. Manufacturers:
   1. Securitron; an Assa Abloy Group company.
B. Power Supply: Hard wired, with multiple zones providing eight (8) breakers for each output panel with individual control switches and LED's; UL (DIR) Class 2 listed.
   1. Operating Temperature: 32 to 110 degrees F.
   2. Provide with emergency release terminals that release devices upon activation of fire alarm system.

2.23 FINISHES

A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
   1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
   2. Exceptions:
      a. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
      b. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.
      c. Door Closer Covers and Arms: Color as selected by Architect from manufacturer's standard colors unless otherwise indicated.
      d. Aluminum Surface Trim and Gasket Housings: Anodized to match door panel finish, not other hardware, unless otherwise indicated.
      e. Hardware for Aluminum Storefront Doors: Finished to match door panel finish, except at hand contact surfaces provide stainless steel with satin finish, unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of correct characteristics.

3.2 ACCESS CONTROL COORDINATION

A. It is the responsibility of the installer to coordinate installation of door hardware with the owner's access control subcontractor.

3.3 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.

C. Install hardware for smoke and draft control doors in accordance with NFPA 105.

D. Use templates provided by hardware item manufacturer.

E. Do not install surface mounted items until application of finishes to substrate are fully completed.

F. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.

1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
2. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
3. Mounting heights in compliance with ADA Standards:
    a. Locksets: 40-5/16 inch.
    b. Push Plates/Pull Bars: 42 inch.
    c. Deadlocks (Deadbolts): 48 inch.
    d. Exit Devices: 40-5/16 inch.
    e. Door Viewer: 43 inch; standard height 60 inch.

G. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

3.4 ADJUSTING

A. Adjust hardware for smooth operation.

B. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.5 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.6 PROTECTION

A. Protect finished Work under provisions of Section 01 70 00 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

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SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Insulating glass units.
B. Glazing units.
C. Glazing compounds and accessories.

1.2 SUBMITTALS

A. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
C. Samples: Submit 1 sample 12 inch by 12 inch in sizeof glass units.
D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience and approved by manufacturer.
C. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.4 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.
B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.5 WARRANTY

A. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
B. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

PART 2 PRODUCTS

2.1 MANUFACTURERS: Subject to compliance with requirements, provide products by one of the following:

A. Glass Fabricators:
   1. Trulite Glass & Aluminum Solutions, LLC.
   2. Cardinal Glass Industries
   3. Guardian Glass, LLC.
   4. Oldcastle Building Envelope.
   5. Pilkington North Ameria, Inc.
   6. Vitro Architectural Glass.
B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
   1. Obtain tinted glass from single source from single manufacturer.
   2. Obtain reflective-coated glass from single source from single manufacturer.
C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with applicable codes and as indicated on Drawings.
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
   5. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
   1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   3. Solar Optical Properties: Comply with NFRC 300 test method.

2.3 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT, Condition A, (uncoated) unless
   3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
   4. Thickness: 3/8".

2.4 INSULATING GLASS UNITS

A. Manufacturers:
   1. Cardinal Glass Industries.
   2. Guardian Glass, LLC.
   3. Pilkington North America Inc.
   4. Vitro Architectural Glass (formerly PPG Glass).

B. Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
   3. Perimeter Spacers: Manufacturer's standard space material and construction.
      a. Products: Subject to compliance with requirements, provide one of the following:
         1) Technoform Glass Insulation; TGI-Spacer.
         2) Thermix; a brand of Ensigner USA; Thermix.
   4. Spacer Color: Black.
   5. Edge Seal:
      a. Dual-Sealed System: Provide manufacturer's standard primary and secondary sealsants.

6. Color: Black.
7. Purge interpane space with dry air, hermetically sealed.

2.5 BASIS OF DESIGN - INSULATING GLASS UNITS

A. Basis of Design - Insulating Glass Units: Vision glazing, with Low-E coating.
   1. Applications: Exterior insulating glass glazing unless otherwise indicated.
   2. Space between lites filled with air.
   3. Total Thickness: 1 inch.
   4. Thermal Transmittance (U-Value), Winter - Center of Glass: .29, nominal.
   5. Visible Light Transmittance (VLT): 45 percent, nominal.
   6. Solar Heat Gain Coefficient (SHGC): .28, nominal.
   7. Visible Light Reflectance, Outside: 7 percent, nominal.
   8. Glazing Method: Dry glazing method, gasket glazing.
   9. Spacer Color: Black.
   10. Edge Seal:
      a. Single-Sealed System: Provide silicone sealant as seal applied around perimeter.
   11. Color: Black.
   12. Purge interpane space with dry air, hermetically sealed.
   13. Basis of Design - Vitro Architectural Glass (formerly PPG Glass).
   14. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
      a. Low-E Coating: Vitro Architectural Glass (formerly PPG Glass) Solarban 60 on #2 surface.
      b. Glass Tint: Solarblue.
   15. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
      a. Glass: Clear.

2.6 GLAZING UNIT SCHEDULE

A. Monolithic Interior Vision Glazing:
   1. Applications: Interior glazing unless otherwise indicated.
   2. Glass Type: Heat-strengthened float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal.
   5. Safety Glazing as indicated on Drawings.

2.7 GLAZING COMPOUNDS

A. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 100/50, Use NT ; with cured Shore A hardness range of 15 to 25; color as selected by Architect from manufacturer's full range.

B. Manufacturers:
   1. BASF Corporation.
   2. Dow Corning Corporation.
   3. Momentive Performance Materials, Inc.
   4. Pecora Corporation.
   5. Sika Corporation; SikaSil WS-290.
   6. Tremco Commercial Sealants & Waterproofing.

2.8 ACCESSORIES

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
F. Glazing Tape: Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
   1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
   2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
G. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
H. Glazing Clips: Manufacturer's standard type.
I. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
B. Verify that the minimum required face and edge clearances are being provided.
C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
D. Verify that sealing between joints of glass framing members has been completed effectively.
E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.3 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.4 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.5 INSTALLATION - WET GLAZING METHOD (SEALANT AND SEALANT)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
B. Place setting blocks at 1/4 points and install glazing pane or unit.
C. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
D. Fill gaps between glazing and stops with manufacturer standard type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
E. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.6 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
B. Remove non-permanent labels immediately after glazing installation is complete.
C. Clean glass and adjacent surfaces after sealants are fully cured.
D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.7 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

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SECTION 09 05 61 - COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
   1. Resilient tile and sheet.
   2. Carpet tile.
   3. Thin-set ceramic tile and stone tile.

B. Preparation of new concrete floor slabs for installation of floor coverings.

C. Testing of concrete floor slabs for moisture and alkalinity (pH).

D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
   1. CMr shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under CMr's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

E. Remedial floor coatings.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.3 SUBMITTALS

A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.
   2. Manufacturer's required bond/compatibility test procedure.

B. Adhesive Bond and Compatibility Test Report.

C. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
   1. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
   2. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

1.4 QUALITY ASSURANCE

A. The flooring subcontractor is responsible for all adhesive and bonding tests to substrates for which the flooring will be installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.

B. Deliver materials in manufacturer’s packaging; include installation instructions.

C. Keep materials from freezing.

1.6 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.1 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following

characteristics:

1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.

B. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.

1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
2. Products:
   a. ARDEX Engineered Cements; ARDEX MC RAPID.
   b. LATICRETE International, Inc; LATICRETE NXT Vapor Reduction Coating with LATICRETE NXT Level Plus.
   c. Sika Corporation; Sikafloor Moisture Tolerance Epoxy Primer and Sikafloor Self-Leveling Moisture Tolerant Resurfacer.
   d. TEC, an H.B. Fuller Construction Products Brand; TEC LiquiDam EZ with TEC Level Set 200 SLU.
   e. Tnemec Company, Inc; Series 208 Epoxoprime MVT.
   f. Spray Lock SCP327.

PART 3 EXECUTION

3.1 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:

1. Preliminary cleaning.
2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
5. Specified remediation, if required.
6. Patching, smoothing, and leveling, as required.
7. Other preparation specified.
8. Adhesive bond and compatibility test.
9. Protection.

B. Remediations:

1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching

compound over entire suspect floor area.

3.2 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.3 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F1869 and as follows.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

F. Report: Report the information required by the test method.

3.4 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the CMr's convenience.

C. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.

D. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.5 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.6 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.7 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

3.8 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

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SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.
B. Metal stud wall framing.
C. Metal channel ceiling framing.
D. Gypsum wallboard.
E. Joint treatment and accessories.
F. Textured finish system.

1.2 SUBMITTALS

A. Product Data: Provide data on metal framing, gypsum board, glass mat faced gypsum board, accessories, joint finishing system, and partition head to structure connectors, showing compliance with requirements.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
    1. See PART 3 for finishing requirements.
B. Interior Partitions, Indicated as Sound-Rated: Provide completed assemblies with the following characteristics:
    1. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
C. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
    1. Fire Rated Partitions: UL listed assembly as indicated on Drawings.
D. STC-Rated Assemblies: Provide complete assemblies identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by and independent agency.

2.2 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
    1. ClarkDietrich.
    2. Jaimes Industries.
    3. Marino.
    4. R-stud, LLC.
    5. Phillips Manufacturing Co.
    6. SCAFCO Corporation.
    7. Steel Construction Systems.
B. Structural Steel Framing for Application of Gypsum Board: As specified in Section 05 40 00.
C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 7.5 psf.
    1. Studs: "C" shaped with knurled or emobossed faces.
    2. Runners: U shaped, sized to match studs.
    3. Ceiling Channels: C-shaped.
    4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
    5. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
        a. Products:
            1) Same manufacturer as other framing materials.
            2) ClarkDietrich; RC Deluxe Resilient Channel: www.clarkdietrich.com/#sle.
            3) Phillips Manufacturing Co; RC-2 Resilient Sound Channel: www.phillipsmfg.com/#sle.
            4) Substitutions: See Section 01 60 00 - Product Requirements.

D. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
E. Area Separation Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with specified performance requirements.
F. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
    1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
    2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.
    3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
    4. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-resistance rating of the wall assembly.
        a. Products:
            1) FireTrak Corporation; Posi Klip.
            2) Metal-Lite, Inc; The System.
            3) Substitutions: See Section 01 60 00 - Product Requirements.
    5. Deflection and Firestop Track:
    6. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.
G. Non-structural Framing Accessories:
    1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
    2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
        a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
        b. Height: 35-3/4 inches.
        c. Products:
            1) ClarkDietrich; Pony Wall (PW).
    3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
        a. Products:
            1) ClarkDietrich; FastBridge Clip (FB33).
    4. Flexible Wood Backing: Fire-retardant-treated wood with sheet steel connectors.
        a. Products:
            1) ClarkDietrich; Danback.

2.3 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board: Subject to compliance with requirements, provide products by one of the following:
    1. American Gypsum Company.
    2. CertainTeed Corporation.
    3. Continental Building Products.
    4. Georgia-Pacific Gypsum.
    5. National Gypsum Company
    6. PABCO Gypsum.
    7. USG Corporation.
B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
3. Thickness:
    a. Vertical Surfaces: 5/8 inch.
    b. Ceilings: 5/8 inch.
    c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
4. Paper-Faced Products:
    a. American Gypsum Company; FireBloc Type X Gypsum Wallboard.
    b. CertainTeed Corporation; Type X Drywall.
    c. Continental Building Products; Firecheck Type X.
    d. Georgia-Pacific Gypsum; ToughRock Fireguard X.
    e. Substitutions: See Section 01 60 00 - Product Requirements.
5. Mold Resistant Paper Faced Products:
    a. American Gypsum Company; M-Bloc Type X.
    b. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall.
    c. Continental Building Products; Mold Defense Type X.
    d. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard.
    e. National Gypsum Company; Gold Bond XP Gypsum Board.
    f. Substitutions: See Section 01 60 00 - Product Requirements.

C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 1/2 inch.
3. Edges: Tapered.
4. Products:
    a. CertainTeed Corporation; Interior Ceiling Drywall.
    b. Continental Building Products; Sagcheck.
    c. Georgia-Pacific Gypsum; ToughRock Span 24 Ceiling Board.
    d. Substitutions: See Section 01 60 00 - Product Requirements.

2.4 Gypsum Wallboard ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 4 inch.

B. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
1. Types: As detailed or required for finished appearance.
2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead, L-bead, and LC-bead at exposed panel edges.

C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
2. Joint Compound: Drying type, vinyl-based, ready-mixed.
    a. Products:
        1) CertainTeed Corporation; Extreme All-Purpose Joint Compound.
        2) Continental Building Products.

D. Finishing Compound: Surface coat and primer, takes the place of skim coating.
1. Products:
    a. CertainTeed Corporation; Quick Prep Plus Interior Prep Coat.

E. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

1. Products:
    a. CertainTeed Corporation; Level V Wall and Ceiling Primer/Surfacer with M2Tech.

F. Textured Finish Materials: Latex-based compound; plain.
1. Products:
    a. CertainTeed Corporation; Extreme Texture Coat/Acrylic Texture with M2Tech.

G. Nails for Attachment to Wood Members: ASTM C514.

H. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
1. Level ceiling system to a tolerance of 1/1200.
2. Laterally brace entire suspension system.
3. Install bracing as required at exterior locations to resist wind uplift.

C. Studs: Space studs at 16 inches on center.
1. Extend partition framing as indicated in Drawings.
2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
1. Orientation: Horizontal.
2. Spacing: As indicated.

F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.

G. Blocking: Install wood blocking for support of:
1. Framed openings.
2. Wall-mounted cabinets.
3. Plumbing fixtures.
4. Toilet partitions.
5. Toilet accessories.
6. Wall-mounted door hardware.

3.3 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
1. Place one bead continuously on substrate before installation of perimeter framing members.
2. Place continuous bead at perimeter of each layer of gypsum board.
3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.4 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
   1. Exception: Tapered edges to receive joint treatment at right angles to framing.

C. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

D. Installation on Metal Framing: Use screws for attachment of gypsum board.

E. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For nonrated assemblies, install as follows:
   1. Single-Layer Applications: Screw attachment.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
   1. Not more than 30 feet apart on walls and ceilings over 50 feet long.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.6 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 3: Walls to receive textured wall finish.
   4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   5. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
   6. Level 0: Temporary partitions.
   7. Level 0: Surfaces indicated to be finished in later stage of project.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.
   2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
   3. Taping, filling, and sanding are not required at base layer of double-layer applications.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.7 TEXTURE FINISH

A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

3.8 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

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SECTION 09 30 00 - TILING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tile for floor applications.
B. Tile for wall applications.
C. Cementitious backer board as tile substrate.
D. Ceramic trim.
E. Non-ceramic trim.

1.2 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
B. Samples: Mount tile and apply grout on two plywood panels, minimum 36 by 36 inches in size illustrating pattern, color variations, and grout joint size variations.
C. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    1. Extra Tile: 10 square feet of each size, color, and surface finish combination.
    2. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.3 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136 and TCNA (HB) on site.
B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
C. Installer Qualifications:
    1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.5 FIELD CONDITIONS

A. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.1 TILE

A. Manufacturers: Subject to compliance with requirements, provide products from the following manufacturer list.
    1. American Olean Corporation.
    2. Dal-Tile Corporation.
    3. Emser Tile, LLC.
    4. Interceramic.
    5. Terrazzo & Marble Supply Companies.
    6. Fiandre Architectural Surfaces.
    7. Landmark Ceramics.
B. Porcelain tile, type as identified on the drawings.
    1. Size: As indicated on Drawings.
    2. Color: As indicated on drawings.
    3. Pattern: As indicated on drawings.
    4. Products: As indicated on Drawings.
C. Glass tile, type as identified on the drawings.
    1. Opacity: As indicated on drawings.
    2. Edges: Square.

3. Color(s): As indicated on drawings.
4. Pattern: As indicated on drawings.

2.2 TRIM AND ACCESSORIES

A. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
   1. Applications:
      a. Open Edges: Bullnose.
      b. Inside Corners: Jointed.
      c. Floor to Wall Joints: Cove base.
   2. Manufacturers: Same as for tile.

B. Non-Ceramic Trim: Satin brass anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
   1. Applications:
      a. Open edges of wall tile.
      b. Open edges of floor tile.
      c. Wall corners, outside and inside.
      d. Transition between floor finishes of different heights.
      e. Floor to wall joints.
      f. Borders and other trim as indicated on drawings.
   2. Manufacturers:
      a. Schluter-Systems.
      b. Genesis APS International.

2.3 SETTING MATERIALS

A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
   1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
   2. Products:
      a. ARDEX Engineered Cements; ARDEX N 23 MICROTEC.
      b. Custom Building Products; ProLite Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer.
      c. TEC, an H.B. Fuller Construction Products Brand; TEC Ultimate Large Tile Mortar.

2.4 GROUTS

A. Standard Grout: ANSI A118.6 standard cement grout.
   1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
   2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
   3. Color(s): As indicated on drawings.
   4. Products: Subject to compliance with requirements provide products by one of the following:
      a. Custom Building Products; Polyblend Non-Sanded Grout.
      b. LATICRETE International, Inc; LATICRETE 1500 Sanded Grout.
      c. Mapei Corporation

B. Stain Resistant Grout Additive: Liquid admixture for sanded and unsanded cement-based grouts; mix with dry grout material in place of water.
   1. Applications: all grout applications.

2.5 Maintenance Materials

A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
   1. Applications: Between tile and plumbing fixtures.

2. Color(s): As selected by Architect from manufacturer's full line.
3. Products: Subject to compliance with requirements, provide products by one of the following:
   a. ARDEX Engineered Cements; ARDEX SX.
   b. Custom Building Products; Commercial 100% Silicone Caulk.
   c. LATICRETE International, Inc; LATICRETE LATASIL.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
1. Composition: Water-based colorless silicone.
2. Products: Subject to compliance with requirements, provide products by one of the following:
   a. Merkrete, by Parex USA, Inc; Merkrete Grout Sealer.

2.6 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
1. Crack Resistance: No failure at 1/8 inch gap, minimum.
2. Fluid or Trowel Applied Type:
   a. Material: Synthetic rubber, Synthetic rubber, Acrylic, or Acrylic.
   b. Thickness: 20 mils, maximum.
   c. Products:
      1) LATICRETE International, Inc; LATICRETE Blue 92 Anti-Fracture Membrane ; LATICRETE Blue 92 Anti-Fracture Membrane.
      2) Merkrete, by Parex USA, Inc; Merkrete Fracture Guard ; Merkrete Fracture Guard.

B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
1. Crack Resistance: No failure at 1/16 inch gap, minimum; comply with ANSI A118.12.
2. Fluid or Trowel Applied Type:
   a. Material: Synthetic rubber or Acrylic.
   b. Thickness: 25 mils, minimum, dry film thickness.
   c. Products:
      1) ARDEX Engineered Cements; ARDEX 8+9.
      2) Custom Building Products; RedGard Crack Prevention and Waterproofing Membrane.
      3) TEC, an H.B. Fuller Construction Products Brand; TEC HydraFlex Waterproofing Crack Isolation Membrane
      4) LATICRETE International, Inc; LATICRETE HYDRO BAN.

C. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
1. Products:
   a. Custom Building Products; WonderBoard Lite Backerboard.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
   1. Moisture Emission Rate: Not greater than 3 lb per 1000 sq ft per 24 hours, test in accordance with ASTM F1869.
   2. Alkalinity (pH): Verify pH range of 5 to 9, test in accordance with ASTM F710.

E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

E. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

C. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

D. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

E. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

F. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

G. Form internal angles square and external angles bullnosed.

H. Install ceramic accessories rigidly in prepared openings.

I. Install non-ceramic trim in accordance with manufacturer's instructions.

J. Sound tile after setting. Replace hollow sounding units.

K. Keep control and expansion joints free of mortar, grout, and adhesive.

L. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

M. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

N. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.

B. Over wood substrates, install in accordance with TCNA (HB) Method F142, with standard grout, unless otherwise indicated.
C. Over wood substrate with backer board underlayment, install in accordance with TCNA (HB) Method F144, for cementitious backer boards, with standard grout.

3.5 INSTALLATION - WALL TILE

A. On exterior walls install in accordance with TCNA (HB) Method W244, thin-set over cementitious backer units, with waterproofing membrane.
B. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.
C. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.6 CLEANING

A. Clean tile and grout surfaces.

3.7 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

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SECTION 09 51 00 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Suspended metal grid ceiling system.
B. Supplementary acoustical insulation above ceiling.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
B. Do not install acoustical units until after interior wet work is dry.

1.3 SUBMITTALS

A. Product Data: Provide data on suspension system components.
B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.4 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Armstrong World Industries, Inc.
   2. CertainTeed Corporation.
   3. USG.
   4. Chicago Metallic.
   5. Rockfon.
B. Suspension Systems:
   1. Same as for acoustical units.

2.2 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.
B. Acoustical Tile Type ACT1: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
   1. Basis of Design Product: USG Radar ClimaPlus High-NRC/High-CAC
   2. Size: 24 x 24 inches.
   3. Thickness: 3/4" inches.
   4. Light Reflectance: 0.84 percent, determined in accordance with ASTM E1264.
   5. NRC Range: Minimum of 0.70 as determined in accordance with ASTM E1264.
   6. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
   7. Edge: Square.
   8. Surface Color: White.
C. Acoustical Tile Type ACT2: Vinyl faced mineral fiber, ASTM E1264 Type IV, with the following characteristics:
   1. Size: 24 by 24 inches.
   2. Thickness: 3/4 inches.
   3. Edge: Square.
   4. Surface Color: White.

2.3 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

B. Exposed Steel Suspension System: Formed galvanized steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Finish: White painted.

2.4 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
B. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
C. Acoustical Insulation: ASTM C665 friction fit type, unfaced batts.
   1. Thickness: 2 inch.
   2. Size: To fit acoustical suspension system.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify that layout of hangers will not interfere with other work.

3.2 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
C. Locate system on room axis according to reflected plan.
D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
I. Do not eccentrically load system or induce rotation of runners.
J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

3.3 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.
B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
C. Fit border trim neatly against abutting surfaces.
D. Install units after above-ceiling work is complete.
E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
F. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.
G. Lay acoustical insulation for a distance of 48 inches either side of acoustical partitions as indicated.
H. Install hold-down clips on panels within 20 ft of an exterior door.

3.4 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

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SECTION 09 65 00 - RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Resilient tile flooring.
B. Resilient base.
C. Installation accessories.

1.2 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
B. Shop Drawings: Indicate seaming plans and floor patterns.
C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
D. Concrete Sub-floor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Flooring Material: 100 square feet of each type and color or 10%, whichever is greater.
   2. Extra Wall Base: 10 linear feet of each type and color, or 10%, whichever is greater.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience and approved by flooring manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
B. Store all materials off of the floor in an acclimatized, weather-tight space.
C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
D. Protect roll materials from damage by storing on end.
E. Do not double stack pallets.

1.5 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.1 TILE FLOORING

A. Vinyl Tile: Surface-decorated, with wear layer.
   1. Manufacturers: Subject to compliance with requirements provide products by one of the following:
      a. Amtico Company.
      b. Shaw Industries Group, Inc.
      c. J&J Flooring Group LLC.
      d. Interface.
   2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
   3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
   4. Tile Size: As indicated on drawings.
   5. Total Thickness: 5 mm approximate.
   6. Pattern: As indicated on drawings.
   7. Color: As indicated on drawings.

2.2 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style A, Straight.
   1. Manufacturers: Subject to compliance with requirements provide products by one of the following:
      a. Burke Flooring.
      b. Johnsonite, a Tarkett Company
      c. Roppe Corp.
   2. Height: As indicated on Drawings.
   3. Length: Roll.
   4. Color: As indicated on drawings.
   5. Accessories: Premolded external corners and internal corners, or job formed.

2.3 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
C. Moldings, Transition and Edge Strips: Same material as flooring.
   1. Manufacturers: Subject to compliance with requirements provide products by one of the following:
      a. Burke Flooring.
      b. Johnsonite, a Tarkett Company.
      c. Roppe Corp.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
   1. Test in accordance with Section 09 05 61.
   2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
D. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
C. Prohibit traffic until filler is fully cured.

3.3 Installation - General

A. Starting installation constitutes acceptance of sub-floor conditions.
B. Install in accordance with manufacturer's written instructions.
C. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
D. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
   1. Resilient Strips: Attach to substrate using adhesive.
E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
F. Install flooring in recessed floor access covers, maintaining floor pattern.

G. At movable partitions, install flooring under partitions without interrupting floor pattern.

3.4 Installation - Tile Flooring

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

3.5 Installation - Resilient Base

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.6 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.7 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

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SECTION 09 68 13 - TILE CARPETING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.2 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

B. Shop Drawings: Indicate layout of joints.

C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.3 Warranty

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.5 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Tile Carpeting: Subject to compliance with requirements provide products by one of the following:

1. Aladdin Commercial.
2. Mohawk Group.
3. Interface, Inc.
4. Milliken & Company.
5. Tandus.
6. J&J Flooring Group, LLC.
7. Shaw Industries Group, Inc.

2.2 MATERIALS

A. Tile Carpetin

1. Product Line: As indicated on Drawings.
2. Size: As indicated on Drawings.
3. Color: As indicated on Drawings.
4. Pattern: As indicated on Drawings..
5. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").

2.3 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Adhesives:

1. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.

C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

D. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.

1. Test in accordance with Section 09 05 61.
2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

D. Vacuum clean substrate.

3.3 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

F. Locate change of color or pattern between rooms under door centerline.

G. Fully adhere carpet tile to substrate.

H. Trim carpet tile neatly at walls and around interruptions.

I. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 84 30 - SOUND-ABSORBING WALL AND CEILING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sound-absorbing panels.

1.2 SUBMITTALS

A. Product Data: Manufacturer's printed data sheets for products specified.
B. Shop Drawings: Fabrication and installation details, panel layout, and fabric orientation.
C. Selection Samples: Manufacturer's color charts for fabric covering, indicating full range of fabrics, colors, and patterns available.
D. Verification Samples: Fabricated samples of each type of panel specified; 12 by 12 inch, showing construction, edge details, and fabric covering.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store units flat, in dry, well-ventilated space; do not stand on end.
B. Protect edges from damage.

PART 2 PRODUCTS

2.1 FABRIC-COVERED SOUND-ABSORBING UNITS

A. Sound Absorbing Units: Manufacturer assembled fabric-covered panels.
   1. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
B. Fabric-Covered Acoustical Panels:
   1. Panel Assembly: As indicated on drawings.
   2. Panel Size: As indicated on drawings.
   3. Panel Thickness: As inidicated on drawings.
   4. Corners: Square.
   5. Fabric: Designtex Everywhere Texture.
   6. Color: As indicated.
   7. Suspension Method: Suspension cables.

2.2 FABRICATION

A. Fabric Wrapped, General: Fabricate panels to sizes and configurations as indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.
   1. Where radiused or mitered corners are indicated, install fabric to avoid seams or gathering of material.
   2. For panels suspended from ceiling, provide fabric covering both sides, with seams only at panel edges.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.
B. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.
C. Install acoustical units to construction tolerances of plus or minus 1/16 inch for the following:
   1. Plumb and level.
   2. Flatness.
   3. Width of joints.

3.3 CLEANING

A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

END OF SECTION

SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.
B. Field application of paints.
C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Exposed surfaces of steel lintels and ledge angles.
D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Non-metallic roofing and flashing.
   6. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead.
   7. Marble, granite, slate, and other natural stones.
   8. Floors, unless specifically indicated.
   9. Ceramic and other types of tiles.
   10. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
   11. Exterior insulation and finish system (EIFS).
   12. Glass.
   13. Concealed pipes, ducts, and conduits.

1.2 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.3 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
B. Samples: Submit two paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
C. Manufacturer's Instructions: Indicate special surface preparation procedures.
D. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   2. Label each container with color in addition to the manufacturer's label.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.6 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.

1. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
2. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

B. Paints:

1. Behr Process Corporation
2. PPG Paints.
3. Rodda Paint Company.
4. Sherwin-Williams Company.

C. Primer Sealers: Same manufacturer as top coats.

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.

1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
4. Supply each paint material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

C. Colors: As indicated in Color Schedule.

1. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.3 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
B. Patching Material: Latex filler.
C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.
B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
D. Test shop-applied primer for compatibility with subsequent cover materials.
E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Fiber Cement Siding: 12 percent.
   2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
   3. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
C. Remove or repair existing paints or finishes that exhibit surface defects.
D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
E. Seal surfaces that might cause bleed through or staining of topcoat.
F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
G. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
H. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
   2. Prepare surface as recommended by top coat manufacturer.
I. Fiber Cement Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
J. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
K. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
L. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

M. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

N. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.5 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

3.6 SCHEDULE - MPI SYSTEMS

A. Substrate: Exposed structural steel and handrails.

1. MPI System: EXT 5.1D.
2. Primer: Alkyd Primer; MPI # 79.
3. Intermediate Coat: Alkyd; MPI # 94.
4. Top Coat: Alkyd; MPI # 94.
5. Sheen: Gloss Level 4.

END OF SECTION

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior paint.

1.2 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

B. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.

C. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   2. Label each container with color in addition to the manufacturer's label.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.5 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.
   2. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

B. Paints:
   1. Behr Process Corporation.
   2. PPG Paints.
   3. Sherwin-Williams Company.

C. Primer Sealers: Same manufacturer as top coats.

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

C. Colors: As indicated on drawings.
   1. Extend colors to surface edges; colors may change at any edge as directed by Architect.
   2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

2.3 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, wood, plaster, galvanized steel, and aluminum.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
      a. Products:
         1) Sherwin-Williams ProMar 200 HP Series, Eg-Shel. (MPI #145)
         2) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Flat.
   3. Top Coat Sheen:
      a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
      b. Eggshell: MPI gloss level 3; use this sheen at all locations.
   4. Primer: As recommended by top coat manufacturer for specific substrate.

B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
   1. Medium duty applications include doors, door frames, railings, handrails, guardrails, and balustrades.
   2. Two top coats and one coat primer.
   3. Top Coat(s): High Performance Architectural Interior Latex; MPI #139, 140, or 141.
      a. Products:
         1) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Eg-Shel. (MPI #139)
   4. Top Coat Sheen:
      a. Satin: MPI gloss level 4; use this sheen at all locations.
   5. Primer: As recommended by top coat manufacturer for specific substrate.

C. Paint I-OP-MD-WC - Medium Duty Vertical and Overhead: Including gypsum board, plaster, concrete, shop primed steel, galvanized steel, and aluminum.
   1. Two top coats and one coat primer.
   2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
      a. Products:

1) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Eg-Shel. (MPI #139)

3. Top Coat Sheen:
   a. Eggshell: MPI gloss level 3; use this sheen at all locations.
4. Primer: As recommended by top coat manufacturer for specific substrate.

D. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
1. Shop primer by others.
2. One top coat <>.
3. Top Coat: Latex Dry Fall; MPI #118, 155, or 226.
   a. Products:
      1) Sherwin-Williams Waterborne Acrylic Dryfall, Flat. (MPI #118)
4. Top Coat Sheen:
   a. Flat: MPI gloss level 1; use this sheen at all locations.

2.4 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
B. Patching Material: Latex filler.
C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.
B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
D. Test shop-applied primer for compatibility with subsequent cover materials.
E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Gypsum Wallboard: 12 percent.
2. Plaster and Stucco: 12 percent.
3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
C. Remove or repair existing paints or finishes that exhibit surface defects.
D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
E. Seal surfaces that might cause bleed through or staining of topcoat.
F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
G. Concrete:
1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
2. Clean concrete according to ASTM D4258. Allow to dry.
H. Masonry:

1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
2. Prepare surface as recommended by top coat manufacturer.

I. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

J. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

K. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.

L. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

M. Copper: Remove contamination by steam, high pressure water, or solvent washing.

N. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

O. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

P. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

Q. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.5 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 10 11 00 - VISUAL DISPLAY UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tackboards.

1.2 SUBMITTALS

A. Product Data: Provide manufacturer's data on tackboard, tackboard surface covering, trim, and accessories.

B. Maintenance Data: Include data on regular cleaning, stain removal.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. ADP Lemco, Inc.

B. Claridge Products and Equipment, Inc.

C. MooreCo, Inc.

D. Nelson Adams NACO.

E. Polyvision Corporation.

2.2 VISUAL DISPLAY UNITS

A. Tackboards: Cork.

1. Size: As indicated on drawings.
2. Frame: Solid wood.

2.3 MATERIALS

2.4 ACCESSORIES

A. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.2 PREPARATION

A. Acclimatize tackable wall panels by removing from packaging in installation area not less than 24 hours before application.

B. Remove switchplates, wall plates, and surface-mounted fixtures where tackable wall paneling is applied. Reinstall items on completion of installation.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install boards in accordance with manufacturer's instructions.

B. Secure units level and plumb.

C. Install tackable wall panels in accordance with manufacturer's recommendations on specified substrates with concealed attachments.

3.4 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

B. Cover with protective cover, taped to frame.

C. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION

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SECTION 10 14 00 - SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cutout dimensional characters and shapes.
B. Exterior LED display panels.
C. Panel signs.

1.2 SUBMITTALS

A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including text to be applied, sign and letter sizes, fonts, and colors.
    1. Submit for approval by Owner through Architect prior to fabrication.
C. Samples: Submit one sampleof each type of sign, of size similar to that required for project, illustrating sign style, font, shape, any exposed accessories, and method of attachment.
D. Selection Samples: Coordinate colors design with Owner to achieve pantone colors of Owner branding.
E. Verification Samples: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
    1. Dimensional Characters: Half-size Sample of each type of dimensional character.
    2. Exposed Accessories: Full-size Sample of each accessory type.
F. Show signage mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
G. Sample Warranty: For special warranty.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.
B. Wiring Diagrams.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.
B. Package room and door signs in sequential order of installation, labeled by floor or building.
C. Store tape adhesive at normal room temperature.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signage that fail in materials or workmanship within specified warranty period.
    1. Failures include, but are not limited to, the following:
        a. Deterioration of finishes beyond normal weathering.
        b. Deterioration of embedded graphic image.
        c. Separation or delamination of sheet materials and components.
    2. Warranty Period: Five years from Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and the ICC A117.1.
B. Thermal Movements: For exterior fabricated channel dimensional characters, allow for thermal movements from ambient and surface temperature changes.
    1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PANEL SIGN MANUFACTURERS

A. Panel Signs: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles.

1. Best Sign Systems, Inc.
2. Cosco Industries.
3. FASTSIGNS.
4. Inpro.
5. Mohawk Sign Systems, Inc.
6. Seton Identification Products.
7. Signs & Decal Corporation.
8. Vista System.

2.3 PANEL SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 <>, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Building Identification Signs:
   1. Use individual metal letters.
   2. Mount on outside wall in location indicated on drawings.

C. Other Dimensional Letter Signs: Wall-mounted.

2.4 PANEL SIGN TYPES

A. Color and Font: Unless otherwise indicated:
   1. Character Font: Helvetica, Arial, or other sans serif font.
   2. Character Case: Upper case only.
   3. Background Color: As selected by Architect from manufacturer full line of colors.
   4. Character Color: Contrasting color. As selected by Architect from manufacturer full line of colors.

2.5 PANEL SIGNS

A. Panel Sign as indicated on Drawings: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles.

B. Solid-Sheet Sign: Acrylic sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph and as follows:
   1. Thickness: Manufacturer's standard for size of sign.
   2. Surface-Applied, Flat Graphics: Applied vinyl film.
   3. Surface-Applied, Raised Graphics: Applied polymer characters and Braille.

C. Sign-Panel Perimeter: Finish edges smooth.
   1. Edge Condition: As indicated on Drawings.
   2. Corner Condition in Elevation: As indicated on Drawings.

D. Mounting: Manufacturer's standard method for substrates indicated, surface mounted to wall with concealed anchors, adhesive, or two face tape.

E. Surace Finish and Applied Graphics:
   1. Integral Acrylic
   2. Sheet Color: As selected by Architect from full range of industry colors.

F. Text and Typeface: Accessible raised characters and Braille.

G. Flatness Tolerance: Sign shall remain flat or uniformly curved under installed conditions as indicated on Drawings and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

2.6 PANEL SIGN MATERIALS

A. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

B. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.

C. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.7 DIMENSIONAL CHARACTER AND SHAPES

A. Cutout Characters and Shapes as indicated on Drawings: Characters and Shapes with uniform faces; square-cut, smooth and eased edges; precisely formed lines and profiles; and as follows:
   1. Character Material: Sheet or Plate Aluminum for exterior applicaitons, MDF for interior applications.
   2. Character Height: As indicated on Drawings.
   3. Thickness: As indicated on Drawings.
   4. Finishes:
      a. Painted Finishes:
         1) Interior Finish: Provide acryllic latex paint to MDF substrates.
         2) Exterior Finish: Provide manufacturer standard paint to sheet metal.
   5. Mounting: Stand off-hardware mounted to sheathing and through cladding material.
   6. Typeface: As indicated on Drawings.

2.8 EXTERIOR LED DISPLAY PANELS

A. LED Display: Single sided LED display with screen dimensions of 48 inches high and 86 inches wide with an approximate aspect ratio of 9:16.
   1. Light-Emitting Diodes (LEDs): Internally illuminated signs shall utilize LEDs as specified for long term performance. Utilize white LEDs with a wavelength/color temperature of 6500 kelvin (K) unless otherwise specified. Each white LED module shall have a minimum light output of 24 lumens per module. LED shall be warrantied for a minimum of 100,000 hours. All power supplies shall provide constant current.
   2. Protective LED Display Cover: Provide vandal resistant UV solar grade high-impact resistant polycarbonate sign cover. Basis-of-design to be Lexan polycarbonate SGC-100 or equivalent.
   3. Minimum Pixel Pitch: 16 mm.
   4. Primary Electronical Voltage: 120 volts.
   5. Final electrical connections will be provided to sign installer utilizing a licensed electrician at the time of installation.
   6. Provide all remote power supplies, transformers, UL approved metal boxes and housings, secondary conduit runs, electrical wiring, installation hardware, disconnect switches, insulators, boots, and any miscellaneous components as required for a complete installation.
   7. Provide adequate ventilation systems for all sign components including motorized ventilation systems where forced ventilation is recommended by the manufacturer.
   8. Full color streaming video capability: 4.4 trillion colors, minimum 60 frames per second capable of fully animated graphics and capable of utilizing at minimum the AVI, JPS, TIFF, and MP4 file types.

B. LED Sign Cabinet:
   1. Mount sign cabinet onto monument sign base as identified on the drawings.
   2. Sign cabinet shall be designed and constructed to be tightly sealed and weather protected to prevent incursion of water, moisture, dirt, fine sand particles and insect infestation. All external joints shall be continuously sealed to avoid electrical failure due to condensation or an accumulation of dust and dirt while still allowing for adequate ventilation and moisture drainage per manufacturer recommendations.
   3. All interior surfaces of LED sign cabinet to be painted white with light enhancement paint (LEP) for otimum illumination output.

C. Scheduling Tansmissions:

1. Scheduling to be made in 12 or 24-hour formats.
2. Scheduling software shall be in the cloud and sent to the display panel by wireless signal through integral on-board cellular communications equipment.
3. Sign should automatically reboot system disk after power outage.

2.9 MATERIALS

A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

D. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.10 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
   1. Pre-assemble signs in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
   2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
   3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
   4. Internally brace signs for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
   5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
   6. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
   7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
   1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match sign-background color unless otherwise indicated
   2. Stainless-Steel Brackets: Factory finish brackets to match sign background finish unless otherwise indicated.

C. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into indicated sign surface to produce precisely formed copy, incised to uniform depth.
   1. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.
   2. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with manufacturer's standard enamel. Apply manufacturer's standard opaque background color coating to back face of

acrylic sheet.

D. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

E. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

2.11 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.12 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. Inserts: Furnish inserts to be set by other installers into concrete or masonry work.

B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

D. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish hot-dip galvanized hardware unless otherwise indicated

E. Sign Mounting Fasteners:

1. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
2. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
3. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Verify that electrical service is correctly sized and located to accommodate signs.

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.

3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:
1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
3. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and plaques that do not comply with specified requirements. Replace signage with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
B. Remove temporary protective coverings and strippable films as signs are installed.
C. Upon completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 10 21 13.19 - PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid plastic toilet compartments.

1.2 SUBMITTALS

A. Product Data: Provide data on panel construction, hardware, and accessories including manufacturer's installation instructions and typical installation details.

B. Samples: Submit two samples of partition panels, 4 x 4 inch in size illustrating panel finish, color, and sheen.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Solid Plastic Toilet Compartments, Basis of Design Product: Subject to compliance with requirements, provide Accurate Partitions Corporation, Solid Plastic Paritions, or comparable product by one of the following:

1. BradleyCorp.
2. Inpro.
3. Scranton Products (Santana/Comtec/Capital).
4. Global Partitions.

2.2 PLASTIC TOILET COMPARTMENTS

A. Solid Plastic Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286; floor-mounted headrail-braced.

1. Color: As indicated on drawings..

B. Doors:

1. Thickness: 1 inch.
2. Width: 24 inch.
3. Width for Handicapped Use: 36 inch, out-swinging.
4. Height: 55 inch.

C. Panels:

1. Thickness: 1 inch.
2. Height: 55 inch.
3. Depth: As indicated on drawings.

D. Pilasters:

1. Thickness: 1 inch.
2. Width: As required to fit space; minimum 3 inch.

E. Screens: Without doors; to match compartments; mounted to wall with two panel brackets.

2.3 ACCESSORIES

A. Pilaster Shoes: Stainless steel, satin finish, 3 inches high; concealing floor fastenings.

1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Extruded aluminum, anti-grip profile.

C. Wall and Pilaster Brackets: Stainless steel; manufacturer's standard type for conditions indicated on drawings.

D. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.

E. Hinges: Stainless steel, manufacturer's standard finish.

1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.

F. Door Hardware: Stainless steel, manufacturer's standard finish.

1. Door Latch: Slide type with exterior emergency access feature.
2. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify correct spacing of and between plumbing fixtures.
C. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
C. Attach panel brackets securely to walls using anchor devices.
D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.
B. Maximum Variation From Plumb: 1/8 inch.

3.4 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

3.5 SCHEDULES

END OF SECTION

SECTION 10 26 00 - WALL AND DOOR PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Corner guards.

1.2 SUBMITTALS

A. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.

B. Maintenance Data: For each type of product . Include information regarding recommended and potentially detrimental cleaning materials and methods.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.

B. Protect work from moisture damage.

C. Protect work from UV light damage.

D. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in conformance with manufacturer's recommendations for each type of item.

E. Store products in either horizontal or vertical position, in conformance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Corner Guards:

1. Babcock-Davis.
2. Inpro.
3. Koroseal Interior Products.
4. Nystrom, Inc.
5. Trim-Tex, Inc.

2.2 PERFORMANCE CRITERIA

A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for conformance to applicable provisions of ASTM D256 and/or ASTM F476.

2.3 PRODUCT TYPES

A. Corner Guards - Surface Mounted:

1. Material: stainless steel.
2. Width, Corner Condition, Color, and Length: As indicated on drawings

B. Adhesives and Primers: As recommended by manufacturer.

C. Mounting Brackets and Attachment Hardware: Appropriate to component and substrate.

2.4 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

B. Verify that substrate surfaces for adhered items are clean and smooth.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

B. Position corner guard above flooring base or 4 inches above finished floor where no base is provided.

END OF SECTION

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Commercial toilet accessories.
B. Electric hand dryers.
C. Diaper changing stations.
D. Utility room accessories.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.3 SUBMITTALS

A. Product Data: Submit data on accessories describing size, finish, details of function, attachment methods.
B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data

PART 2 PRODUCTS

2.1 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
    1. Grind welded joints smooth.
    2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
B. Stainless Steel Sheet: ASTM A666, Type 304.
C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
E. Zinc Alloy: Die cast, ASTM B86.
F. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
G. Adhesive: Contact type, waterproof.
H. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.
I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.2 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

2.3 Commercial Toilet Accessories

A. Toilet Paper Dispenser: Double roll, surface mounted bracket type, polished stainless steel, spindleless type for tension spring delivery designed to prevent theft of tissue roll.
    1. Basis-of-Design: Subject to compliance with requiremetns, provide Bobrick, B-265 ClassicSeries toilet paper dispenser or comparable product by one of the following:
        a. AJW Architectural Products
        b. American Specialties, Inc.
        c. Bradley Corporation
        d. Gamco USA
B. Toilet Paper Dispenser: Single Jumbo-roll, satin stainless steel unit, 10" nominal roll size.
    1. Basis-of-Design: Subject to compliance with requirements, provide Bobrick B-2890 toilet paper dispenser or comparable product by one of the following:
        a. AJW Architectural Products

b. American Specialties, Inc.
c. Bradley Corporation
d. Gamco USA

C. Paper Towel Dispenser: Folded paper type, satin stainless steel, surface-mounted, with viewing slots on sides as refill indicatorand tumbler lock.
1. Capacity: 525 multifold towels minimum.
2. Basis-of-Design: Subject to compliance with requirements, provide Bobrick B-262 ClassicSeries paper towel dispener or comparable product by one of the following:
a. AJW Architectural Products
b. American Specialties, Inc.
c. Bradley Corporation
d. Gamco

D. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gauge refill indicator, tumbler lock.
1. Minimum Capacity: Fourty (40) ounces.
2. Basis-of-Design: Subject to compliance with requirements, provide Bobrick B-2112 soap dispenser or comparable product by one of the following:
a. AJW Architectural Products
b. American Specialties, Inc.
c. Bradley Corporation
d. Gamco

E. Mirrors: Stainless steel channel framed, 1/4 inch thick annealed float glass; ASTM C1036.
1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
2. Size: 24" x 30".
3. Frame: 0.05 inchangle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
4. Basis-of-Design: Subject to compliance with requirements, provide Bobrick B-165 2430 or comparable product by one of the following:
a. AJW Architectural Products
b. American Specialties, Inc.
c. Bradley Corporation
d. Gamco

F. Grab Bars: Satin stainless steel, nonslip grasping surface finish.
1. Standard Duty Grab Bars:
2. Push/Pull Point Load: 250 pound-force, minimum.
3. Dimensions: 1 1/2" inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
4. Finish: Satin.
5. Length and Configuration: 18", 36", and 42" as indicated on drawings and located complying with ADA requirements.
6. Basis-of-Design: Subject to compliance with requirements, provide Bobrick Model 6806 Series grab bars or product by one of the following:
a. AJW Architectural Products
b. American Specialties, Inc.
c. Bradley Corporation
d. Gamco USA

G. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
   1. Basis-of-Design: Subject to compliance with requirements, provide Bobrick B-254 sanitary napkin disposal of comparable product by one of the following:
      a. AJW Architectrual Products
      b. American Specialties, Inc.
      c. Bradley Corporation
      d. Gamco USA

2.4 Electric Hand/Hair Dryers

A. Electric Hand Dryer: Wall mounted, compact, airblade type.
   1. Basis-of-Design: Subject to complliance with requirements, provide Dyson Airblade V or equivalent.

2.5 Diaper Changing Stations

A. Diaper Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
B. Diaper Changing Station: Stainless steel wall-mounted folding diaper changing station for use in commercial facilities.
   1. Material: Stainless steel.
   2. Mounting: Surface.
   3. Basis-of-Design: Subject to compliance with requirements, provide American Specialties 9013-9 Roval diaper changing station or comparable product by the following:
      a. Bradley Corporation

2.6 Utility Room Accessories

A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
   1. Drying rod: Stainless steel, 1/4 inch diameter.
   2. Hooks: 2, 0.06 inch stainless steel rag hooks at shelf front.
   3. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
   4. Length: Manufacturer's standard length for number of holders/hooks.
   5. Basis-of-Design: Subject to compliance with requirements, provide American Specialties, Inc. 1315-3 utility shelf/mop and broom holder or comparable product by one of the following:
      a. AJW Architectural Products
      b. Bradley Corporation
      c. Gamco USA

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify exact location of accessories for installation.
C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
D. Verify that field measurements are as indicated on drawings.

3.2 PREPARATION

A. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights: As required by accessibility regulations and as indicated on drawings.

3.4 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.
B. Fire extinguisher cabinets.

1.2 SUBMITTALS

A. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions for each type of product.
B. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.3 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fire Extinguishers:
   1. Ansul, a Tyco Business.
   2. Kidde, a unit of United Technologies Corp.
   3. Nystrom, Inc.
   4. Amerex.
   5. JL Industries, Inc.; a division of the Activar Construction Products Group.
   6. Larsens Manufacturing Company.
   7. Guardian Fire Equipment, Inc.
B. Fire Extinguisher Cabinets and Accessories:
   1. Activar Construction Products Group.
   2. Kidde, a unit of United Technologies Corp.
   3. Larsen's Manufacturing Co.
   4. Nystrom, Inc.
   5. Guardian Fire Equipment, Inc.

2.2 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) for purpose specified and as indicated.
B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.
   1. Basis of Design Product: Subject to compliance with requirements, provide Larsens Manufacturing Company; MP10 or comparable product by one of the manufacturers listed above.
   2. Class: A:B:C type.
   3. Size: 10 pound.
   4. Finish: Baked polyester powder coat, red color.

2.3 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
B. Cabinet Construction: As indicated on drawings.
C. Cabinet Configuration: Recessed type with multipurpose dry chemical fire extinguisher.
   1. Basis of Design Product: Subject to compliance with requirements, provide Larsens Manufacturing Company; 2409-R2 Architectural Series Vertical Duo or comparable product by one of the manufacturers listed above.
   2. Size to accommodate accessories.
   3. Trim: Flat edge.

4. Trim and Door Material: Steel sheet.
5. Door Glazing: Clear transparent acrylic sheet.
6. Indentification: Identify fire extinguisher in fire protection cabinet with the words FIRE EXTINGUISHER. Comply with requirements of authorities having jurisdiction.
    a. Location: Applied to cabinet door.
    b. Application process: Pressure-sensitive vinyl letters.
    c. Lettering color: Red.
    d. Orientation: Vertical.

D. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.
B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install cabinets plumb and levelin wall openings, 60 inches from finished floor to top of cabinet, confirm height acceptable to authorities having jurisdiction.
C. Secure rigidly in place.
D. Place extinguishers in cabinets.

END OF SECTION

SECTION 10 56 17 - WALL MOUNTED STANDARDS AND SHELVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel shelf standards, brackets, and accessories.
B. Closet rods for mounting on brackets.

1.2 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store products under cover and elevated above grade.
B. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Steel Shelf Standards, Brackets, and Accessories:
    1. Pilaster Shelf Standards and Supportsts: Single-slotted channel standards for brackets adjustable in 1/2 inch increments along entire length of standard, drilled and countersunk or dimpled for screws.
        a. Basis-of-Design Products: Subject to compliance with requirements provide Knape and Vogt, 255 Pilaster Standards and 256R bracket or equivalent.
        b. Standard Material: 17 gage aluminum, min
        c. Support Material: Zinc and rubber pad.
        d. Lengths: Ordered and cut as needed to fit available shelf space as indicated on drawings.
        e. Finish: Natural aluminum finish.
        f. Brackets: Sheet metal, reinforced, locking into slots, sized to suit shelves, and inlcuding a rubber pad to protect shelf from contact to metal.
        g. Bracket Quantity: Provide five (5) brackets for each adjustable shelf indicated on drawings.
B. Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions. Finish of exposed to view fasteners to match finish of standards and other components.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Mount standards to solid backing capable of supporting intended loads.
C. Install brackets, shelving, and accessories.

3.4 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 10 75 00 - FLAGPOLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum Flagpoles.

1.2 SUBMITTALS

A. Product Data: Provide data on pole, accessories, and configurations.

B. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.

C. Delegated-Design Submittal: For flagpoles.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.

B. Protect flagpole and accessories from damage or moisture.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Flagpoles:

1. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.
2. American Flagpole.
3. Concord Industries, Inc.
4. Pole-Tech Co, Inc.

2.2 FLAGPOLES

A. Flagpoles: Designed in accordance with NAAMM FP 1001

1. Material: Aluminum.
2. Design: Straight shaft.
3. Mounting: Ground mounted type.
4. Nominal Height: 35 feet measured from nominal ground elevation.
5. Halyard: External type.

B. Performance Requirements:

1. Delegated Design: Engage a qualified professional engineer to design flagpole assemblies.
2. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.
3. Wind Pressure Loading on Flagpole with Flag: Resistant without permanent deformation to wind speed as indicated on drawings, in accordance with NAAMM FP 1001; the factor of safety used is 2.5.

2.3 POLE MATERIALS

A. Aluminum: ASTM B241/B241M , 6063 alloy , T6 temper.

2.4 ACCESSORIES

A. Finial Ball: Stainless steel, 6 inch diameter.

B. Cleats: 9 inch size, aluminum with galvanized steel fastenings, two per halyard.

C. Halyard: 5/16 inch diameter polypropylene, braided, white.

D. Halyard Flag Snaps: Nylon swivel snap hooks with neoprene or vinyl covers. Furnish two per halyard.

E. Finish exposed metal surfaces to match flagpole.

2.5 MOUNTING COMPONENTS

A. Foundation Tube Sleeve: AASHTO M 36, corrugated 16 gage, 0.0598 inch steel, galvanized, depth as indicated on drawings.

2.6 MISCELLANEOUS MATERIALS

A. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.
B. Sand: ASTM C 33/C 33M, fine aggregate.
C. Elastomeric Joint Sealant: Multicomponent nonsag urethane joint sealant complying with requirements in Section 07 92 00 "Joint Sealants."
D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.7 FINISHING

A. Aluminum: Mill finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.

3.2 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.
B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
C. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.
D. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.
E. Place concrete, as specified in Section 03 30 00 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.
F. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.3 INSTALLATION

A. Install flagpole , base assembly, and fittings in accordance with manufacturer's instructions.
B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

3.4 TOLERANCES

A. Maximum Variation From Plumb: 1 inch.

3.5 ADJUSTING

A. Adjust operating devices so that halyard and flag function smoothly.

END OF SECTION

SECTION 11 51 16 - BOOK DEPOSITORY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outdoor Book Depository

1.2 SUBMITTALS

A. Product Data including ADA compliancy requirements..

PART 2 PRODUCTS

2.1 OUTDOOR BOOK DEPOSITORY

A. Subject to compliance with requirements, provide Kingsley 30 S-Series Outdoor Depository.
   1. Material: Aluminum.
   2. Fire Suppression: Unit must be airtight and capable of self-smothering a fire.
   3. Finish: Powder coat.
      a. Color: Blue.
   4. Locking Method: Cart access door with locking mechanism.
   5. Transport Cart: Heavy Duty Cart.
   6. Accessories:
      a. Braille tag.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification that installation surface is acceptable to receive the work of this section. Document all unacceptable conditions in writing and distribute them to the CMr.

3.2 INSTALLATION

A. Install in accordance with manufacturer's written instructions, requirements, and recommendations.

3.3 CLEANING

A. Clean the finished surface as recommended by manufacturer.
B. Protect the finished surface from construction activities after installaion.

END OF SECTION

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SECTION 12 24 00 - WINDOW SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior manual roller shades.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
   2. Do not install shades until final surface finishes and painting are complete.

1.3 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories. Include shade schedule indicating size, location, and keys to installation instructions, head, jamb, and sill details, and mounting dimension requirements for each product and conditions.

B. Verification Samples: Minimum size 6 inches square, representing actual materials, color and pattern. Provide three samples of each finish sample.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.

B. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.6 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 WARRANTY

A. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
   1. Shade Hardware: One year.
   2. Fabric: One year.
   3. Aluminum and Steel Coatings: One year.

PART 2 PRODUCTS

2.1 Manufacturers

A. Interior Manually Operated Roller Shades:
   1. Draper, Inc; Clutch Operated FlexShade.
   2. Hunter Douglas Architectural; RB500 Manual Roller Shades.
   3. Lutron Electronics Co., Inc; Contract Roller Manual Roller Shades.
   4. MechoShade Systems LLC; Mecho/5 System.
   5. SWFcontract, a division of Springs Window Fashions, LLC.
   6. PowerShades.

2.2 Roller Shades

A. General:
   1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
   2. Provide shade system that operates smoothly when shades are raised or lowered.
   3. Motorized Shades: Motor system housed inside roller tube, controlling shade movement via motor controls indicated; listed or recognized to UL 325.
      a. Comply with NFPA 70.

b. Electrical Components: Listed, classified, and labeled as suitable for the purpose intended. Where applicable, system components to be FCC compliant.
c. Motors: Size and configuration as recommended by manufacturer for the type, size, and arrangement of shades to be operated; integrated into shade operating components and concealed from view; fully compatible with controls to be installed.

B. Roller Shades:
1. Description - Interior Roller Shades: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
a. Roll Direction: Roll down, closed position is at window sill.
b. Mounting: Window jamb mounted - inside, between jambs.
c. Size: As indicated on drawings.
d. Fabric: As indicated on drawings. See finish sechedule.
2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
a. Material: Stamped steel.
3. Roller Tubes: As required for type of shade operation.
a. Material: Extruded aluminum, clear anodized finish.
b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge.
4. Hembars: Designed to maintain bottom of shade straight and flat.
a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
5. Manual Operation for Interior Shades:
a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
b. Drive Chain: Continuous loop beaded ball chain, 95 pounds minimum breaking strength. Provide upper and lower limit stops.
c. Chain Retainer:
1) Chain tensioning device complying with WCMA A100.1.
2) Manufacturer's standard clip.

2.3 ROLLER SHADE FABRICATION

A. Field measure finished openings prior to ordering or fabrication.
B. Dimensional Tolerances: As recommended in writing by manufacturer.
C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.
B. Start of installation shall be considered acceptance of substrates.

3.2 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
B. Coordinate with window installation and placement of concealed blocking to support shades.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Replace shades that exceed specified dimensional tolerances at no extra cost to Owner.
C. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.4 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.
B. Replace shades that cannot be cleaned to "like new" condition.

3.5 PROTECTION

A. Protect installed products from subsequent construction operations.
B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

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SECTION 12 36 00 - COUNTERTOPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Countertops for architectural cabinet work.

1.2 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

B. Shop Drawings: Complete details of materials and installation. Combine countertop shop drawings with the corresponding casework shop drawings.

C. Verification Samples: For each finish product specified, minimum size 4 inches square, representing actual product, color, and patterns.

D. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.5 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 COUNTERTOPS

A. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
   1. Flat Sheet Thickness: 3/4 inch, minimum.
   2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; orthophthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
      a. Manufacturers:
         1) E.I. du Pont de Nemours and Company.
         2) Daltile; ONE
         3) Consentino; Silestone USA.
         4) Terrazzo & Marble Supply Companies; DIFINITI Quartz.
         5) Terrazzo & Marble Supply Companies; Diresco Belgium Quartz, a brand of Diresco - North America.
         6) Wilsonart.
      b. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with the MIA Dimension Stone Design Manual.
      c. Finish on Exposed Surfaces: Polished.
      d. Color and Pattern: As indicated on drawings.
   3. Other Components Thickness: 3/4 inch, minimum.
   4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.

5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
6. Fabricate in accordance with manufacturer's standard requirements.

2.2 MATERIALS

A. Wood-Based Components:
   1. Wood fabricated from old growth timber is not permitted.
B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
C. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.
D. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
E. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
F. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.3 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.
C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
C. Seal joint between back/end splashes and vertical surfaces.

3.4 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
C. Field Joints: 1/8 inch wide, maximum.

3.5 CLEANING

A. Clean countertops surfaces thoroughly.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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210500 – COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 CODE SECTIONS

A. 2012 International Mechanical Code

B. 2012 International Building Code

C. 2012 International Plumbing Code

D. 2011 National Electric Code

E. 2012 International Fire Code

F. ADA – American Disabilities Act

G. ANSI – American National Standards Institute

H. ASHRAE – American Society of Heating Refrigerating and Air Conditioning Engineers

I. ASTM – American Society of Testing Materials

J. NFPA – National Fire Protection Association

K. NFPA 13 - Installation of Sprinkler Systems

L. NFPA 13R - Installation of Sprinkler Systems in Residential Occupancies up to and Including four stories in height

M. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances

N. NEMA – National Electrical Manufactures Association

O. OSHA – Occupational Safety and Health Act

P. UL – Underwriter's Laboratories

Q. All codes listed on architectural Code Reference Sheet or project cover sheet.

1.2 GENERAL

A. Provide all work in accordance with applicable codes, rules, ordinances, and regulations of local, State, and Federal Governments and other Authorities Having Jurisdiction (AHJ).

B. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the drawings and specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system functioning as indicated by the design and the equipment specified. Elements of the work include materials, supervision, supplies, equipment, transportation, and utilities.

C. The drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The contractor shall use the drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system. Plans shall not be scaled

D. Contractor shall coordinate with all other trades to ensure that all required project components are included in project bid.

E. If in any case the plans or specifications conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

F. If in any case the plans or specifications conflict with themselves, the most stringent of the conflicting information shall be the basis for bid. Contractor shall seek clarification of all conflicts prior to bid.

G. All change order requests shall be accompanied with itemized tabular breakdown of all materials and labor associated with installation of all associated materials for review of the design team. Lump sum pricing will not be accepted.

H. Contractor shall refer to each drawing and specification section in construction document set. No bids shall be submitted without review of all construction documents.

I. All pipe sizes indicated in this specification are nominal pipe sizes (NPS).

1.3 LOCAL CONDITIONS

A. Visit site and determine existing local conditions affecting work in contract.

B. Failure to determine site conditions or nature of existing or new construction will not be considered a basis for granting additional compensation.

1.4 ALLOWABLE MANUFACTURERS

A. Allowable manufactures for all products listed in division 21 are listed on “Schedule of Manufacturers” on plans.

1.5 SUBMITTAL REQUIREMENTS

A. Submittals for products in division 21 shall include the following items.

1. Product data showing type, model and construction characteristics of product.

2. Layout drawings for any systems requiring interconnection of various system components.

3. All other documentation required to show compliance with the specifications.

B. Contractor shall allow a minimum of ten working days for design team of review of submittals.

1.6 WARRANTY REQUIREMENTS

A. Unless noted elsewhere in the specifications, all work shall be warrantied for a period of not less than one year from the date of substantial completion. The contractor shall provide work at no additional cost to correct any deficiencies in their work that were identified to have been present during the warrantied period.

B. The following additional items shall be guaranteed:

1. Piping shall be free from obstructions, holes or breaks of any nature.

2. Insulation shall be effective.

3. Proper circulation of fluid in each piping system.

C. The above guarantees shall include both labor and material; and repairs or replacements shall be made without additional cost to the Owner.

D. Any remedial work as a result of the above-mentioned items shall be performed promptly, upon written notice from the Architect or Owner.

1.7 DEMOLITION

A. Where demolition work is required contractor shall disconnect, demolish and remove plumbing systems, equipment and components indicated to be removed.

B. All patching of piping and other fixtures shall be performed with materials matching existing conditions and reinsulated to maintain performance of previous conditions.

C. All equipment to be removed and reinstalled shall be disconnected, with services capped, cleaned and stored for reconnection.

D. Owner shall have first right of refusal for all materials being removed.

E. If pipe, insulation, or equipment to remain is damaged or unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

F. Where demolition process has caused damage to equipment, fixtures, piping and other devised deemed to remain these items shall be repaired at plumbing contractor's expense to the approval of the Architect.

1.8 INSTALLATION

A. All equipment in division 21 shall be installed according to manufacturer's requirements and minimum code requirements. If an any case the plans or specifications are in conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

B. Apply firestopping to penetrations of fire rated floor and wall assemblies for electrical installations to restore original fire resistance rating of assembly.

C. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

D. If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

E. Install all equipment to facilitate service, maintenance and repair or replacement of components of both plumbing equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

PART 2 – PRODUCTS

2.1 SLEEVES

A. Sleeves shall be constructed from the following materials at contractor's option.

1. Galvanized steel round tubing, closed with welded longitudinal joint.

2. Schedule 40 Steel Pipe.

3. DUCTED RETURN ONLY – Schedule 40 PVC pipe.

2.2 ESCUTCHEONS

A. Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. Options:

1. One-Piece, deep-drawn, box-shaped brass with polished chrome-plated finish.

2. One-Piece, Cast-Brass with set screw with polished chrome plated finish.

3. Split-Casting, Cast-Brass with concealed hinge and set screw and polished chrome plated finish.

2.3 GROUT

A. ASTM C 1107, grade B, nonshrink and nonmetallic, dry hydraulic-cement grout

B. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

C. Design Mix: 5000 psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

211310 – FIRE SUPPRESSION SPRINKLER SYSTEMS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 DESIGN REQUIREMENTS

A. Fire sprinkler shall be designed in accordance with NFPA 13 standards.

B. Fire protection sprinkler contractor shall provide complete design of sprinkler system. Any details, routing or equipment shown on plans shall be incorporated into design as part of minimum design requirements.

C. Fire protection sprinkler system shall be designed via delegated design. System design shall include comprehensive engineering analysis by a qualified professional engineer, licensed to design fire sprinkler systems in jurisdiction encompassing the project location.

D. Design Engineer of record shall make final determination of Sprinkler hazard classification.

E. The system shall be a complete system as required by local authorities. All wiring required by the contract shall be provided by the contractor.

F. Design shall include all water supply piping, pumps, storage tanks and other appurtenances required for supply of sprinkler system from water supply source.

G. In instances in which a fire pump is required based on engineered system design, Fire Protection Contractor shall review the electrical plans to verify that electrical service is explicitly called out for powering the fire pump. If no circuit is present, Fire Protection Contractor shall include circuiting of the fire pump in his bid or shall notify A/E for clarification prior to bid.

H. Design shall account for all ductwork, conduit or piping intended to be routed through structure. Sprinkler piping located in conflict with other trades will require relocation unless physical limitations prohibit alternate installation.

I. Provide hydrant flow test as required for design.

J. System shall include dry pipe system or electric heating cables and pipe insulation for all areas subject to freeze. Contractor shall include air compressor, and all electrical circuiting required for freeze protection methods.

K. Project Description:

1. Library building of approximately 18,000 square feet. Building is single story. Sprinkler system shall be automatically actuated.

2. Areas at risk of freezing include a patio space of approximately 1,800 square feet, Exterior drive through canopy of approximately 800 square feet, and canopy over walk area of approximately 350 square feet.

1.2 STANDPIPE DESIGN REQUIREMENTS

A. Standpipe shall be hydraulically designed in accordance with NFPA 14. System shall be designed to provide a minimum of 100 PSI of pressure at topmost hose connection.

B. Locate standpipe risers as required or where located on plans.

1.3 INSTALLATION AND EXECUTION REQUIREMENTS

A. Furnish all design, labor, materials, fabrication, equipment, and services necessary to provide a complete and operational automatic fire sprinkler system as specified herein and as required for satisfactory operation of the system.

B. After installation all piping shall be completely flushed and hydrostatically tested for a period of not less than two hours at 200 PSI pressure. Upon detection of any leaks, system shall be completely drained, leaks repaired and retested. No portion of the system shall be concealed until system is certified to be free of leaks. Authority having jurisdiction shall be present during testing. Contractor shall make proper notice of authorities to obtain testing observation as needed for project schedule. Contractor shall notify owner 24 hours in advance of all tests to allow owner's observation at their discretion.

C. Flexible hose fittings shall be permitted for installation in lay-in ceilings where allowed by local authority having jurisdiction.

D. Contractor shall furnish spare sprinkler heads of each type used in the project. If quantity of head is less than or equal to 300, provide six spare heads. If quantity of head is greater than 300, provide twelve spare heads. Contractor shall provide emergency spare cabinet, and shall locate cabinet in mechanical room as directed by owner or where indicated on plans.

E. Sprinkler heads shall be centered in ceiling tiles where installed in lay-in ceiling.

F. Sprinkler heads shall be centered between rows of lights and coordinated with HVAC diffuser and grille locations.

G. Sprinkler piping shall be installed tight to bottom of floor deck or roof structure above and closely coordinated with other trades. Installation at bottom of structural members such as bar joists shall only be performed if all other trades are coordinated with sprinkler piping and location of piping does not interfere with the installation of other trades.

H. Where all sprinkler piping cannot be installed in bar joists due to solid building structural members. Sprinkler piping system shall be designed with lines routed perpendicular to building structure in no more than one location. Branches shall tee off of top of main line to accommodate installation of branch piping at bottom of roof deck.

I. Sprinkler piping shall be concealed in all areas in which a drywall or lay in ceiling is specified. Contractor shall seek clarification from A/E for any areas in which they wish to expose piping.

J. Installation location of all sprinkler piping and heads shall account for all ductwork, conduit or piping intended to be routed through structure. Sprinkler piping located in conflict with other trades will require relocation unless physical limitations prohibit alternate installation.

K. Electrical tamper and flow switches are not shown but are required. Contractor shall provide switches at all valves in system as required and shall provide the wiring for connection to the fire alarm system or alarm communicator as applicable.

L. Provide all flow switches, gongs, bells, horns, etc. as required by local authority having jurisdiction regardless of indication on plans.

M. Install system with drains for complete system drainage.

N. Pressurize and check pre action sprinkler system piping and air pressure maintenance devices or air compressors where applicable.

O. Do not install pendant or sidewall wet sprinklers in areas subject to freezing.

P. Where applicable, do not interrupt existing sprinkler service to facilities occupied by owner or others unless under the following conditions and then only after arranging to provide temporary service:

1. Notify Architect no fewer than seven days of proposed interruption of existing service.

2. Do not proceed with interruption of existing service without written permission of owner or owner’s agent.

1.4 SUBMITTAL REQUIREMENTS

A. All submittal documents shall bear the seal and signature of the design engineer, licensed to design fire suppression sprinkler systems in the jurisdiction encompassing the project location.

B. Provide scaled layout drawings indicating locations of piping runs, sprinkler heads, slopes of horizontal runs, head elevations, wall and floor penetrations and connections. Indicate adjacent equipment, and fixtures on plan to depict clearances with all other trades.

C. Submittals of required wiring shall be included in the submittal package and sent to the local Authority. All submittal documents shall be sent to their review and approval. Submit approved and stamped submittals from authority having jurisdiction as a new submittal on project website.

1.5 CERTIFICATION AND INSPECTION

A. The fire protection engineer of record shall inspect the system installation for conformance with design and all applicable code requirements. Contractor shall submit report indicating all deficiencies or conflicts a minimum of

two weeks prior to substantial completion. Report shall bear seal and signature of engineer of record. All work required to correct deficiencies, conflicts and errors noted in the report shall be performed by installing contractor at no additional expense. As built records of all hydraulic calculations shall be revised to include and any all additions and modifications and shall bear the seal of the engineer of record.

B. Provide certification upon completion of installation of sprinkler system indicating system is in compliance with and has been tested in accordance with applicable NFPA standards.

1.6 QUALIFICATION

A. Fire protection work shall be installed by a contractor with a minimum of three years of successful installation experience. Project experience shall include projects of similar scope and size to the project depicted on drawings. Contractor shall hold all licenses and certifications required in local jurisdiction.

1.7 HEAD TYPE SCHEDULE:

A.	Finished Areas:	Concealed
B.	Areas with exposed Ceiling and No Structure:	Exposed
C.	Side Wall:	Semi Recessed
D.	Areas Subject to Abuse – Gyms, Locker Rooms, All other areas noted on plans:	Exposed with Cage

PART 2 – PRODUCTS

2.1 SPRINKLER HEADS

A. Temperature rating of fusible link shall be appropriate for application and ambient condition of area in which the head is located.

B. Finish:

1. Concealed: Brass Unplated heads with cover plate and trim to match ceiling color.
2. Semi Recessed: Brass pendant heads with all parts finished with polished chrome.
3. Exposed: Brass Unplated heads.

2.2 PROTECTIVE CAGE

A. Description: Hard wire steel cage with clear chromate finish over zinc plating.

2.3 FLEXIBLE HOSE FITTINGS

A. Hoses shall be type 304 braided stainless steel with fully welded non-mechanical fittings. Hoses shall be factory leak tested, limited to a maximum length of three feet, with a maximum pressure rating of 175 PSI. Minimum size shall be 1”

B. Hoses shall attached to lay-in ceiling grid with multiport style galvanized ceiling bracket with self securing fasteners to security hose to grid and tamper resistant screws.

C. Hoses and fittings shall comply with all NFPA requirements and performance requirements of Factory Mutual 1637 and UL 2443.

2.4 FIRE DEPARTMENT CONNECTION

A. Contractor shall provide fire department connection on building, as shown on plans. Fire department connection shall be provided in accordance with requirements of local authority. Verify type of fire department connection required prior to bid.

2.5 STANDPIPE AND CONNECTIONS

A. Fire hose valve shall comply with all requirements of authority having jurisdiction. Verify type of hose valve and connection type required prior to bid.

B. Provide pressure regulators set to limit water pressure to 175 PSI at all outlets.

C. Provide hose connections at each floor landing.

D. Where applicable, fasten hose cabinets to building structure and hose racks to standpipe riser.

E. Where applicable fire hose and rack assembly shall consist of pin type swing rack, angle hose valve or gate valve, escutcheon, nipple, unlined lined fire hose, coupling and hose nozzle. Verify all requirements with local authority having jurisdiction.

F. Hose cabinets shall be located where required by local authority having jurisdiction and where noted on plans.

220500 – COMMON WORK RESULTS FOR PLUMBING

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 CODE SECTIONS & INDUSTRY STANDARDS

A. 2012 International Mechanical Code

B. 2012 International Building Code

C. 2012 International Plumbing Code

D. 2011 National Electric Code

E. ADA – American Disabilities Act

F. ANSI – American National Standards Institute

G. ASHRAE – American Society of Heating Refrigerating and Air Conditioning Engineers

H. ASTM – American Society of Testing Materials

I. NFPA – National Fire Protection Association

J. NEMA – National Electrical Manufactures Association

K. OSHA – Occupational Safety and Health Act

L. UL – Underwriter's Laboratories

M. All codes listed on architectural Code Reference Sheet or project cover sheet.

1.2 GENERAL

A. Provide all work in accordance with applicable codes, rules, ordinances, and regulations of local, State, and Federal Governments and other Authorities Having Jurisdiction (AHJ).

B. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the drawings and specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system functioning as indicated by the design and the equipment specified. Elements of the work include materials, supervision, supplies, equipment, transportation, and utilities.

C. The drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The contractor shall use the drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system. Plans shall not be scaled

D. Contractor shall coordinate with all other trades to ensure that all required project components are included in project bid.

E. If in any case the plans or specifications conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

F. If in any case the plans or specifications conflict with themselves, the most stringent of the conflicting information shall be the basis for bid. Contractor shall seek clarification of all conflicts prior to bid.

G. All change order requests shall be accompanied with itemized tabular breakdown of all materials and labor associated with installation of all associated materials for review of the design team. Lump sum pricing will not be accepted.

H. Contractor shall refer to each drawing and specification section in construction document set. No bids shall be submitted without review of all construction documents.

I. Contractor shall provide heat trace cable for all piping installed in areas subject to freezing temperatures.

J. All water lines serving flush valves shall be equipped with hammer arrestors. A single hammer arrestor shall be allowed to be installed on piping main serving a group of flush valves.

K. All pipe sizes indicated in this specification are nominal pipe sizes (NPS).

1.3 LOCAL CONDITIONS

A. Visit site and determine existing local conditions affecting work in contract.

B. Failure to determine site conditions or nature of existing or new construction will not be considered a basis for granting additional compensation.

1.4 ALLOWABLE MANUFACTURERS

A. Allowable manufactures for all products listed in division 22 are listed on “Schedule of Manufacturers” on plans.

1.5 SUBMITTAL REQUIREMENTS

A. Submittals for products in division 22 shall include the following items.

1. Product data showing type, model and construction characteristics of product.

2. Layout drawings for any systems requiring interconnection of various system components.

3. All other documentation required to show compliance with the specifications.

B. Contractor shall allow a minimum of ten working days for design team of review of submittals.

1.6 WARRANTY REQUIREMENTS

A. Unless noted elsewhere in the specifications, all work shall be warrantied for a period of not less than one year from the date of substantial completion. The contractor shall provide work at no additional cost to correct any deficiencies in their work that were identified to have been present during the warrantied period.

B. The following additional items shall be guaranteed:

1. Piping shall be free from obstructions, holes or breaks of any nature.

2. Insulation shall be effective.

3. Proper circulation of fluid in each piping system.

C. The above guarantees shall include both labor and material; and repairs or replacements shall be made without additional cost to the Owner.

D. Any remedial work as a result of the above-mentioned items shall be performed promptly, upon written notice from the Architect or Owner.

1.7 DEMOLITION

A. Where demolition work is required contractor shall disconnect, demolish and remove plumbing systems, equipment and components indicated to be removed.

B. All patching of piping and other fixtures shall be performed with materials matching existing conditions and reinsulated to maintain performance of previous conditions.

C. All equipment to be removed and reinstalled shall be disconnected, with services capped, cleaned and stored for reconnection.

D. Owner shall have first right of refusal for all materials being removed.

E. If pipe, insulation, or equipment to remain is damaged or unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

F. Where demolition process has caused damage to equipment, fixtures, piping and other devised deemed to remain these items shall be repaired at plumbing contractor’s expense to the approval of the Architect.

1.8 INSTALLATION

A. All equipment in division 22 shall be installed according to manufacturer's requirements and minimum code requirements. If an any case the plans or specifications are in conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

B. Apply firestopping to penetrations of fire rated floor and wall assemblies for electrical installations to restore original fire resistance rating of assembly.

C. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

D. If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

E. Install all equipment to facilitate service, maintenance and repair or replacement of components of both plumbing equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

PART 2 – PRODUCTS

2.1 DIELECTRIC FITTINGS

A. Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Dielectric Unions: Factory-fabricated, union assembly, for 250 psig minimum working pressure at 180 deg F.

C. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for minimum working pressure as required to suit system pressures.

D. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300 psig minimum working pressure at 225 deg F.

E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300 psig minimum working pressure at 225 deg F.

2.2 SLEEVES

A. Sleeves shall be constructed from the following materials at contractor's option.

1. Galvanized steel round tubing, closed with welded longitudinal joint.

2. Schedule 40 Steel Pipe.

3. DUCTED RETURN ONLY – Schedule 40 PVC pipe.

2.3 ESCUTCHEONS

A. Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. Options:

1. One-Piece, deep-drawn, box-shaped brass with polished chrome-plated finish.

2. One-Piece, Cast-Brass with set screw with polished chrome plated finish.

3. Split-Casting, Cast-Brass with concealed hinge and set screw and polished chrome plated finish.

2.4 GROUT

A. ASTM C 1107, grade B, nonshrink and nonmetallic, dry hydraulic-cement grout

B. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

C. Design Mix: 5000 psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

220519 – METERS AND GAUGES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION

A. Install connector plugs with socket extending one-third of pipe diameter and in a vertical position in piping.

B. Install connector plugs of sizes required to match thermometer connectors. Provide bushings if required to match sizes.

C. Provide extension of thermowells as required for access beyond piping insulation.

D. Install thermometers in thermowells and adjust position for readability.

E. Install meters and gauges adjacent to machines and equipment to allow service and maintenance of meters, gauges, machines and equipment.

F. After installation calibrate meters according to manufacturer's written instructions.

G. Install thermometers in the following locations:

1. Inlet and outlet of Water Heaters
2. Inlet and outlet of Heat Exchangers
3. Inlet and outlet of domestic hot-water storage tanks
4. Inlet and outlet of domestic water chiller

H. Install pressure gages in the following locations:

1. Water service entrance into building
2. Inlet and Outlet of pressure reducing valves
3. Suction and discharge sides of domestic water pumps

1.2 SCALE

A. Provide scale range of meters and gauges as required for flow rates indicated on drawings and schedules.

PART 2 – PRODUCTS

2.1 BIMETALLIC DIAL THERMOMETER

A. Thermometer shall have stainless steel case and stem, glass window, permanently etched scale markings on dial, dark metal pointer and bimetal coil temperature sensing element.

B. Provide probe suitable for insertion in connector plug with length as required for insertion into gauge connector plug.

C. Thermometer shall have accuracy of plus or minus one percent of scale range.

D. Provide each thermometer with separable well for installation pipe connections.

2.2 THERMOWELL

A. Thermowell shall be constructed in accordance with ASME B40.200 with pressure-tight, socket-type fitting made for insertion into piping tee fitting. Length shall match thermometer bulb or stem and extensions shall be provided to accommodate insulation.

B. Provide thermowell bushings as required to convert internal screw thread to size of thermometer connection.

2.3 PRESSURE GAUGES

A. Pressure gauge shall have stainless steel case and stem, glass window, permanently etched scale markings on dial, dark metal pointer and bourdon type pressure element assembly with copper alloy construction and brass tip.

B. Gauge shall be equipped with mechanical link between pressure element and connection to pointer.

C. Provide probe assembly suitable for insertion in connector plug.

D. Gauge shall have grade 'A' accuracy plus or minus one percent of middle half of scale range.

E. Gauges shall have pressure rating for each specific application.

2.4 TURBINE FLOW METERS

A. Provide impeller turbine type flow meter for installing in piping and measuring flow directly in gallons per minute

B. Display shall show rate of flow with register to indicate total volume in gallons.

C. Accuracy shall be plus or minus 1.5 percent of actual water flow.

D. Provide meter suitable for gas or fluid conveyed through piping system in which meter is installed.

2.5 CONNECTOR PLUGS

A. Provide connector plugs for all pressure gauges and thermometers rated for 500 psi and 200 degrees Farenheit. Plug shall be solid brass construction with two valve cores of neoprene.

220523 – VALVES FOR PLUMBING PIPING

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Prior to installation, examine valve interior for cleanliness. Operate valves to ensure proper operation. Examine guides, seats, threads and flanges to ensure there are no conditions that could cause valve malfunction or leakage. Do no attempt to repair defective valves; replace with new valves.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance and equipment removal without system shutdown. Locate valves for easy access and provide separate support where necessary.

C. Install valves in position to allow full stem movement. Install valves in horizontal piping with stem at or above center of pipe.

D. Install chain wheels on operators for valves 4” and larger and more than 96 inches above finished floor. Extend chains to 60 inches above finished floor.

E. Install necessary valves within piping systems to provide required flow control and to allow isolation for inspection, maintenance and repair of each piece of equipment of fixture and on each main and branch service loop.

F. Valves 2” and smaller have solder, socket weld flanged or screwed end connections as required by associated piping materials unless otherwise noted. Valves 2.5” and larger shall have flanged or butt weld ends as scheduled.

G. Non-rising stem valves shall not be installed at any point in the piping systems unless space is restricted. If a restricted area is identified, contractor shall obtain A/E approval before installation of non-rising stem valve.

H. Valves shall be the same size as adjacent piping. Reduced valve size will not be allowed unless specifically noted.

I. Provide butterfly valves 6” and smaller with latch lock handles for shutoff service.

J. Install globe valves with pressure on top of disc unless prohibited by code. Globe valves requiring drainage for inspection, maintenance or winterization shall be installed with stem in horizontal position to allow complete drainage of piping.

K. Valve pressure and temperature ratings shall not be less than indicated and as required for system pressures and temperatures.

1.2 GENERAL VALVE APPLICATIONS

A. If valve applications are not noted, use the following:

1. Shutoff service: Ball, Butterfly or Gate valves

2. Throttling Service: Balance Valves or butterfly valves

3. Check Valve:

a. Domestic Water 2” and smaller: Bronze Swing Check Valve (horizontal) or Spring Check Valve (vertical)

b. Domestic Water 2.5” and larger: Iron Swing Check Valve

B. Valves shall be sized the same as upstream piping unless otherwise noted.

C. Actuator type valves:

1. Gear actuator for quarter-turn valves 8” and larger

2. Handwheel for valves other than quarter-turn types

3. Hand lever for quarter-turn valves 6” and smaller

D. Valves in Insulated Piping: (shall be provided with 2” stem extensions and the following)

1. Gate Valves shall be provided with rising stem

2. Ball Valves shall be provided with an extended operating handle of non-thermal-conductive material and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

3. Butterfly Valves shall be provided with extended neck

1.3 VALVE ENDS SELECTION

A. Select Valves with the following ends or types of connections:

1. Copper tube 2" and smaller: solder ends, threaded ends

2. Copper tube 2.5" and larger: flanged ends

PART 2 – PRODUCTS

2.1 BALL VALVES

A. Bronze Ball Valve: Class 150 valve. Valve shall conform to standard MSS SP-110. Body design shall be two piece, bronze with threaded ends, stainless steel ball and stem, Teflon seats and full porting. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

2.2 BUTTERFLY VALVES

A. Iron Single Flange Butterfly Valve (2.5" to 12"): Class 200 CWP rated. Valve shall conform to MSS SP-67, Type I. Body design shall be lug type suitable for bi-directional dead-end service at rated pressure without use of downstream flange. Body material shall be ASTM A 126, cast iron or ASTM A 536 ductile iron. Valve shall be equipped with EPDM seat, stainless steel stem and aluminum bronze disc.

B. Iron Single Flange Butterfly Valve (14" to 24"): 150 CWP rated. Valve shall conform to MSS SP-67, Type I. Body design shall be lug type suitable for bidirectional dead end service at rated pressure without use of downstream flange. Body material shall be ASTM A 126 cast iron or ASTM A 536 ductile iron. Valve shall be equipped with EPDM seat, stainless steel stem and aluminum bronze disc.

2.3 GATE VALVES

A. Iron Gate Valve: Class 125, OS&Y valve. Conform to standard MSS SP-70, Type I. Body material shall be ASTM A 126, gray iron with bolted bonnet. Valve shall be equipped with flanged ends, bronze trim, solid wedge disc and asbestos free packing and gasket. Valve shall be designed for repacking under pressure when fully opened and back-seated.

B. Bronze Gate Valve: Class 125, rising stem valve. Conform to MSS SP-80, Type 2. Body material shall be ASTM B 62 bronze with integral seat and union ring bonnet. Valve shall be equipped with threaded ends, bronze stem, solid wedge bronze disc, asbestos free packing and malleable iron hand wheel. Valve shall be designed for repacking under pressure when fully opened and back-seated. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

2.4 GLOBE VALVES

A. Bronze Globe Valve: Class 125 Valve. Conform to MSS SP-80, Type I. Body material shall be ASTM B 62 bronze with integral seat and screw in bonnet. Valve shall be equipped with threaded ends, bronze stem and disc and asbestos free packing. Valve shall be designed for repacking under pressure when fully opened and back-seated.

B. Iron Glove Valve: Class 125 Valve. Conform to MSS SP-85, Type I. Body Material shall be ASTM A 126, gray iron with bolted bonnet. Valve shall be equipped with flanged ends, bronze trim and asbestos free packing and gasket. Valve shall be designed for repacking under pressure when fully opened and back-seated.

2.5 BALANCE VALVES

A. Bronze Circuit Setter Balance Valve: Body material shall be bronze. Valve shall be equipped with precision machined orifice calibrated position indicator, meter connections with built in flanged check valves. Provide complete with polyurethane insulation cover. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

B. Iron Circuit Setter Balance Valve: Body material shall be cast iron. Valve shall be equipped with bronze disc with EPDM insert, stainless steel stem, asbestos free packing and gasket, EPDM seal ring and zinc plated stainless steel bushing.

2.6 SWING CHECK VALVES

A. Bronze swing Check Valve: Class 125 valve. Conform to standard MSS SP-80, Type 3. Valve shall have horizontal flow body design with threaded ends and bronze disc. Body material shall be ASTM B 62 bronze. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

B. Iron Swing Check Valve with Closure Control: Class 125 valve. Conform to standard MSS SP-71, Type I. Valve shall have full waterway design and shall be constructed with ASTM A 126 gray iron and bolted bonnet. Valve shall be equipped with flanged ends, bronze trim, asbestos free gasket and factory installed exterior lever and swing closure control.

2.7 AUTOMATIC FLOW CONTROL VALVES

A. Brass Flow Control Valve: Body material shall be brass with electroless nickel and steel wear surfaces. Valve shall be equipped with stainless steel spring, built in strainer, pressure and temperature ports, shut off valve with Teflon packing and polyurethane insulation cover. For potable water uses, valve shall be lead free, certified to NSF/ANSI 61 of NSF/ANSI 372.

B. Iron Automatic Flow Control Valve: Body material shall be ductile iron with electroless nickel and steel wear surfaces with stainless steel spring and pressure and temperature ports.

220529 – HANGERS, SUPPORTS AND VIBRATION ISOLATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Design seismic restraint hangers and supports for piping and equipment. Obtain approval from authorities having jurisdiction where required by local requirements.

1.2 INSTALLATION OF HANGERS AND SUPPORTS

A. Install hangers, supports, clamps and attachments to support piping properly from building structure. Do not attached to ceilings, equipment, ductwork, conduit or other non-structural elements such as floor or roof decking.

B. Hangers, supports, clamps and attachments shall comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacing specified within Division 22 piping sections. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe as specified above for individual pipe hangers.

C. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length specified in Division 22 piping sections. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping as specified in Division 22 piping sections. Install concrete inserts before concrete is placed; fasten insert to forms. Where concrete with compressive strength less than 2,500 psi is indicated, install reinforcing bars through openings at top of inserts.

D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Provide two nuts on threaded supports to securely fasten the support.

E. Field fabricated heavy duty steel trapeze supports shall be fabricated from steel shapes selected for loads required. Weld steel in accordance with AWS D-1.1.

F. Install appropriate types of hangers and supports to allow control movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.

G. Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

H. Install hangers to provide indicated pipe slopes and so that maximum deflection of piping allowed by ASME B31.9 is not exceeded.

I. Insulated piping:

1. Riser Clamps: Attach riser clamps, including spacers, to piping with riser clamps projecting through insulation. Do not exceed pipe stresses allowed by ASME B31.9. Do not use riser clamps to support horizontal, insulated piping. Seal insulation for hot piping and protect vapor barrier for cold piping as specified in Division 23 “HVAC Insulation”.

2. Insulation protection shield: Install insulation protection shield and high density insulation, sized for the insulation thickness used as specified in insulation schedule. Install a minimum 8” long section at each support point, top and bottom halves or the pipe of same thickness of insulation used.

J. Pre-engineered Support Strut Systems: Channel strut systems can be used at the Contractors option in lieu of individual hangers for horizontal pipes. Space channel strut systems at the required distance for the smallest pipe supported. Provide channel gauge and hanger rods per the manufacturer’s recommendations for the piping supported. Where strut systems are attached to walls, install anchor bolts per manufacturer’s recommendations.

1. Uninsulated copper pipe: Install with plastic galvanic isolators.

2. Insulated Tube or Pipe: Install with 360 degree insulation protection shields or pre-engineered thermal hanger shield inserts.

1.3 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ASME B 31.9 and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ASME B 31.9 and with AWS Standards D1.1.

C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to control movement to compensators.

D. Anchor spacing: Where not otherwise indicated, install anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

1.4 INSTALLATION OF PIPE ALIGNMENT GUIDES

A. Install pipe alignment guides on piping that adjoins expansion joints as required by expansion joint manufacturer and elsewhere as indicated on plans and specification sections to eliminate binding and torsional stress on piping systems. Where not otherwise indicated, install guides as required by ASME B 31.9. Anchor guides to building substrate.

1.5 EQUIPMENT SUPPORTS

A. Fabricate structural steel supports to suspend equipment from structure above or support equipment from floor. Place grout under supports for piping and equipment.

1.6 INSTALLATION OF VIBRATION ISOLATORS

A. Piping runs connected to equipment requiring vibration isolation shall be isolated from building structure at connection to equipment using isolators inserted in supporting piping rods.

B. All floor mounted equipment shall be erected on concrete equipment pads over the complete floor area of the equipment, unless otherwise specified.

C. Provide neoprene mounting sleeves for hold-down bolts to prevent any metal to metal contact.

D. All equipment shall be provided with lateral restraining isolators as required to limit horizontal motion to 0.25" maximum, under all operating conditions.

E. All equipment shall be installed on vibration isolators and shall have a minimum operating clearance of 2" between the bottom of the equipment or inertia base and the concrete equipment pad or bolt heads beneath the equipment unless indicated otherwise.

F. Piping or plumbing equipment shall be supported from building structure and not other equipment, pipes or ductwork.

G. All wiring connections to plumbing equipment on isolators shall be made with a minimum 18" long flexible conduit in a "U" shaped loop.

H. Elastomeric isolators that will be exposed to temperatures below 32 degrees F shall be fabricated from natural rubber instead of neoprene.

I. Springs shall be designed and installed so that ends of springs remain parallel and all springs installed with adjustment bolts.

J. Springs shall be sized to be non-resonant with equipment forcing frequencies or support structure natural frequencies.

1.7 MOUNTING OF CENTRIFUGAL PUMPS:

A. Pumps with their driving motor installed on slab on grade shall be bolted and grouted to equipment pads

B. Pumps with their driving motor installed on suspended slabs shall be bolted and grouted to a spring supported concrete inertia base reinforced.

C. Each concrete base (rectangular or "T" shape) for horizontally split pumps shall include supports and base elbows for the suction and discharge connections. Base elbows shall be bolted and grouted to the concrete foundation.

1.8 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Clean all welds and touch up paint to match factory finish of all materials or color and finish of adjacent materials when supports and adjacent elements are painted.

C. Adjust vibration isolators after piping system is at operating weight.

D. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

E. Adjust active height of spring isolators and adjust restraints to permit free movement of equipment within normal mode of operation.

PART 2 – PRODUCTS

2.1 STEEL PIPE HANGERS AND SUPPORTS

A. Comply with MSS SP-58 types 1-58 factory fabricated components. Hangers shall be pre-galvanized or hot dipped. Where non-metallic coatings area indicated provide plastic coating, jacket or liner.

B. Where hangers are installed in a corrosive environment or outdoors, hangers and supports shall be type 304 stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Trapeze hangers shall comply with MSS SP-69 and shall be type 59 shop or field fabricated pipe support assembly made from structural steel shapes with MSS SP-58 hanger rods, nuts, saddles and U-bolts.

2.3 THERMAL HANGER SHIELD INSERTS

A. Inserts shall have 100 PSI minimum compressive strength and shall be encased in sheet metal shield.

B. For trapeze and clamped systems, insert and shield shall cover entire circumference of pipe.

C. For clevis hangers, insert and shield shall cover lower 180 degrees of pipe.

D. Insert length shall extend 2” beyond sheet metal shield for piping operating below ambient air temperature.

2.4 EQUIPMENT SUPPORTS

A. Provide welded, shop or field fabricated equipment supports made from structural steel shapes.

2.5 PIPE STANDS

A. Pipe stands shall be shop or field fabricated assemblies made of manufactured corrosion resistant components to support roof mounted piping. Provide one piece plastic unit with integral rod roller, pipe clamps or V-Shaped cradle to support pipe. Pipe stand shall be suitable for roof installation without membrane protection.

2.6 VIBRATION ISOLATORS

A. Pads: Pads shall be arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized steel baseplates and factory cut to sizes that match requirements of supported equipment.

B. Mounts: Mounts shall be double deflection type with molded oil resistant rubber, hermetically sealed compressed fiberglass or neoprene isolator elements with factory drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Identify capacity range by color coding or other means.

C. Free Standing Spring Isolators: Free standing spring isolators shall be laterally stable, open spring isolators. Outside diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Minimum additional travel shall be 50 percent of the required deflection at rated load. Isolators shall be capable of supporting 200 percent of the rated load, fully compressed without deformation or failure. Provide factory drilled baseplates and top plates for bolting to equipment and structure.

D. Housed Spring Mounts: Housed spring isolators shall be equipped with ductile iron or steel housing. Mounts shall be equipped with vertically adjustable snubbers allowing 1/4" travel up or down before contacting a resilient collar. Base and top shall have factory drilled holes for bolting to equipment and structure.

E. Elastomeric Hangers: Elastomeric Hangers shall be single or double deflection type fitted with molded, oil resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Identify capacity range by color coding or other means.

F. Spring Hangers: Spring hangers shall be combination coil-spring and elastomeric insert hanger with spring and insert in compression. Frame shall be steel and shall be fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency. Outside spring diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Hanger shall be capable of supporting 200 percent of the rated load, fully compressed, without deformation or failure and shall be equipped with self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

G. Steel Equipment Base: Equipment Base isolators shall be constructed of factory fabricated welded structural steel. Bases shall have shape to accommodate supported equipment. Support brackets shall be factory welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support. Bases shall use steel shapes, plates, and bars complying with ASTM A 32/A 36M.

220553 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 VALVE IDENTIFICATION

A. Provide valve tag on every valve and control device in each piping system. Exclude check valves, valves within factory fabricated equipment units, plumbing fixtures and equipment and similar rough-in connections of end-use fixtures and units.

B. List each tagged valve in valve schedule for each piping system. And provide valve schedule to owner in operations and maintenance manuals.

1.2 PLUMBING EQUIPMENT IDENTIFICATION

A. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of plumbing equipment and each operational device as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

1. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
2. Meters, gauges, thermometers and similar units.
3. Pumps
4. Heat exchangers
5. Water heaters, tanks and pressure vessels.
6. Strainers, water treatment systems and similar equipment.

B. Where lettering larger than 1” height is needed for proper identification because of distance from normal location of required identification, stenciled signs may be provided in lieu of engraved sign at contractor’s option.

C. Lettering shall be minimum 1/4” high where viewing distance is less than 2’-0”; 1/2” high for distances up to 6’-0” and proportionately larger for greater distances. Secondary lettering shall be 2/3 to 3/4 of size of the principal lettering.

1.3 PIPING IDENTIFICATION

A. Install pipe markers on each piping system and include arrows to show normal direction of flow.

B. Install pipe markers where piping is exposed to view, concealed by only a removable ceiling system, installed in machine rooms, installed in accessible maintenance spaces and exterior non-concealed locations.

1. Within 5 feet of each valve and control device.
2. Within 5 feet of each branch, excluding take-offs less than 25 feet in length for fixtures or equipment connections; mark flow direction of each pipe at branch connection.
3. Within 5 feet where pipes pass through walls, floors or ceilings or enter non-accessible enclosures. Provide identification on each side of wall, floor or ceiling.
4. At access doors, manholes and similar access points which permit view of concealed piping.
5. Within 5 feet of major equipment items and other points of origination and termination.
6. Spaced intermediately at maximum spacing or 50’ along each piping run. Spacing shall be reduced to 25’ in congested areas of piping and equipment where there are more than two piping systems or pieces of equipment.

C. Provide identification on the following systems; domestic cold water, domestic hot water, domestic hot water recirculation, lawn irrigation, sanitary waste, storm water, vent and natural gas piping.

PART 2 – PRODUCTS

2.1 ENGRAVED LAMINATE SIGN

A. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thickness indicated, engraved with the engravers standard letter style of the sizes and wording indicated. Signs shall be black with white core except as otherwise noted and shall be punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

B. Thickness shall be 1/16” for units up to 20 square inches or 8” in length and 1/8” for larger units.

C. Signs shall be fastened with self-tapping stainless steel screws, except contact type permanent adhesive where screws cannot or should not penetrate the substrate.

2.2 PLASTIC VALVE TAGS

A. Provide manufacturer’s standard solid plastic valve tags with printed enamel lettering with system abbreviation in approximately 3/16” high letters and sequenced valve numbers approximately 3/8” high and with 5/32” hole for fastener

B. Tags shall be 1-1/8” square white tags with black lettering.

2.3 PAINTED IDENTIFICATION

A. Painting where allowed shall be performed using standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications. Minimum letter height shall be 1.25” high for ductwork and equipment and 0.75” high for access door signs and similar operational instructions.

B. Paint shall be exterior type, oil based, black paint.

2.4 PLASTIC TAPE PIPE MARKERS

A. Provide manufacturer’s standard color-coded pressure sensitive vinyl tame not less than 3 mils thick.

B. Tape width shall be 1.5” for pipes less than 6” in diameter and 2.5” wide for larger pipes.

C. Colors shall comply with ANSI A13.1 except where noted otherwise.

D. Lettering shall be manufacturer’s standard pre-printed nomenclature which best describes piping system in each instance, as selected by A/E in cases of variance with names shown or specified. Abbreviate system names only as necessary for each application length.

E. Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering or as a separate unit of plastic.

220700 – PLUMBING INSULATION

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL

A. Provide necessary materials and accessories for installation of insulation for plumbing and mechanical systems as specified and/or detailed on drawings. Insulation type, jacket, and thickness for specific piping systems or equipment shall be as listed in this specification section.

B. Products or their shipping cartons shall bear label indicating their flame and smoke ratings. Treatments of jackets or facings for impart flame and smoke safety shall be permanent. Use of water-soluble treatments such as corn paste or wheat paste is prohibited. This does not exclude approved lagging adhesives.

C. Install insulation over clean dry surfaces with joints firmly butted together. Insulation at equipment, flanges, fittings, etc. shall have straight edges with box type joints with corner beads as required. Where plumbing and heating insulation terminates at equipment or unions, taper insulation at 30-degree angle to pipe with one coat finishing cement and finish same as fittings. Total insulation system shall have neat smooth appearance with no wrinkles, or folds in jackets, joint strips, or fitting covers. Seal butt joints at maximum intervals of 45 feet to prevent vapor barrier failures from being transmitted to adjoining insulations sections.

D. Undamaged insulation systems on cold surface piping and equipment shall perform their intended functions as vapor barriers and thermal insulation without premature deterioration or vapor barrier. Contractor shall take every reasonable precaution to provide insulation systems with continuous unbroken vapor barriers.

E. Products shall not contain asbestos, lead, mercury or mercury compounds.

1.2 QUALITY ASSURANCE

A. Flame/Smoke Ratings: Provide composite Plumbing insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.

1. Exception: Outdoor Plumbing insulation may have flame spread index of 75 and smoke developed index of 150.

B. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

C. Insulation installer shall advise contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

D. All exterior piping insulation shall be painted with ultraviolet-resistant paint. Color as selected by architect.

E. Provide an aluminum jacket over all exterior piping.

1.3 PIPING INSULATION INSTALLATION

A. Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps.

C. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.

D. Maintain integrity of vapor-barrier jackets on cold pipe insulation and protect insulation with shields to prevent puncture or other damage. Provide high density insulation of material as specified herein and of length equivalent to pipe shield. Provide pipe hangers sized for the pipe outside diameter plus insulation thickness. Seal butt joint between insulation and high-density insulation with wet coat of vapor barrier lap cement.

1. Exception for vertical piping: Provide clamps sized for the outside diameter of the vertical pipe and extend clamp through insulation. Seal penetrations of insulation and vapor barrier with wet coat of vapor barrier lap cement.

E. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

F. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

G. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

H. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

1.4 EQUIPMENT INSULATION

A. Cold equipment (below ambient temperature):

1. Insulate drip pans under chilled equipment and roof drain bodies with either 1” elastomeric flexible insulation or 2” fiberglass for surfaces above 35 deg F or 3” fiberglass for surfaces 35 deg F or lower.

B. Hot equipment (above ambient temperature):

1. Insulate hot water storage tanks and expansion/compression tanks with 1” flexible elastomeric insulation.

C. Install equipment thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.

D. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.

E. Maintain integrity of vapor-barrier on equipment insulation and protect it to prevent puncture and other damage.

F. Do not apply insulation to equipment, breechings, or stacks while hot.

G. Apply insulation using the staggered joint method for both single and double layer construction, where feasible. Apply each layer of insulation separately.

H. Coat insulated surfaces with layer of insulating cement, troweled in workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chipped edges and depressions, and cover over wire netting and joints with cement of sufficient thickness to remove surface irregularities.

I. Cover insulated surfaces with all-service jacketing neatly fitted and firmly secured. Lap seams at least 2". Apply over vapor barrier where applicable.

J. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.

K. Provide removable insulation sections to cover parts of equipment which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.

L. Equipment Exposed to Weather: Protect outdoor insulation from weather by installation of weather-barrier mastic protective finish, or jacketing, as recommended by the manufacturer.

1.5 INSULATION APPLICATION SCHEDULE

A.	Domestic Cold Water (Up to 1.25”)	Elastomeric	0.5” Thickness
B.	Domestic Cold Water (Above 1.25”)	Elastomeric	1” Thickness
C.	Domestic Hot Water (Up to 1.25”)	Elastomeric	1” Thickness
D.	Domestic Hot Water (Above 1.25”)	Elastomeric	1.5” Thickness
E.	Domestic Hot Water Recirculation	Elastomeric	1” Thickness
F.	Vent Piping (Within 6’ of roof outlet)	Elastomeric	0.5” Thickness
G.	Roof Drain Piping	Elastomeric	0.5” Thickness
H.	Condensate Drain	Elastomeric	0.5” Thickness
I.	P-Traps Receiving Condensate Drainage	Elastomeric	0.5” Thickness
J.	Above grade Irrigation Piping	Elastomeric	0.5” Thickness

PART 2 - PRODUCTS

2.1 ELASTOMERIC INSULATION

A. Flexible Elastomeric insulation shall be closed-cell, sponge or expanded-rubber materials and comply with ASTM C 534, type I for tubular materials and type II for sheet products. Maximum insulation conductive value shall be 0.22

BTU-in/(h-sqft-°F). Insulation values shall comply with energy code minimum requirements. See common work results for current code edition.

2.2 FIBERGLASS INSULATION

A. Fiberglass insulation shall be mineral-fiber blanket insulation with mineral or fiber glass fibers bonded with a thermosetting resin and comply with ASTM C 553, type V, without factory applied jacket. Equip fiberglass piping with white jacket. Insulation values shall comply with energy code minimum requirements. See common work results for current code edition.

2.3 ADHESIVES AND TAPES

A. Insulating cements and adhesives shall be compatible with the insulation materials, jackets and substrates for bonding insulation to itself and to surfaces to be insulated.

B. Mastics shall be compatible with insulation materials, jackets, and substrates and shall comply with MIL-C-19565C Type II. Vapor-barrier mastic shall be water based suitable for indoor and outdoor use on below ambient services.

C. Tapes shall be white, vapor-retarder tape matching factory-applied jacket with acrylic adhesive and shall comply with ASTM C 1136.

D. All insulation finishes shall be compatible with the insulation product being finished and shall be in a color as selected by architect.

221100 – FACILITY PIPING AND SPECIALTIES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL

A. Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing, slope, expansion, and other design considerations. So far as practical, install piping as indicated.

B. Use fittings for all changes in direction and all branch connections.

C. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

D. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

E. Seal pipe penetrations through exterior walls using sleeves and sealer.

F. Seal pipe penetrations through underground exterior walls using sleeves and mechanical sleeve sealers.

G. Where pipes pass through fire rated walls, partitions, ceilings and floors, maintain the fire rated integrity.

H. Provide sleeves and seal pipes that pass through waterproof floors, non-fire rated walls, partitions and ceilings or concrete slab on grade.

I. Where pipes pass through foundation walls above strip footings or under strip footings, protect pipes from building load with cast iron soil pipe sleeves two pipe sizes larger than the pipe. Sleeves installed under the strip footing shall be encased in concrete.

J. Piping exposed to interior dry environment shall have a minimum of (1) primer and (1) finish coat of paint. Piping installed in exterior locations shall have a minimum of (1) primer and (2) finish coats of paint with total thickness of at least 5 mils. Finish coat colors in finish areas shall be as selected by architect.

1.2 WATER SERVICE ENTRANCE

A. Extend water distribution piping to connect to water service piping, of size and location indicated on plans.

B. Underground exterior water distribution piping to be a depth as required by local conditions, in accordance with authority having jurisdiction's requirements and at depth not less than 18" below grade.

C. Backflow prevention requirements shall be verified by contractor with local water utility.

D. Sleeve and caulk at penetrations through building floor for watertight installation.

E. Install shutoff valve at service entrance inside building; complete with strainer, pressure gauge, and test tee with valve.

1.3 ROUGH-IN FOR WATER METER

A. Install rough-in piping and specialties for water meter installation in accordance with utility company's instructions and requirements.

1.4 FIELD QUALITY CONTROL

A. Inspect Water Distribution Piping as follows:

1. Do not enclose, cover, or put into operation water distribution piping system until it has been inspected and approved by the authority having jurisdiction.

2. During the progress of the installation, notify the plumbing official having jurisdiction at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.

a. Arrange for inspection of the piping system before concealed or closed in after system is roughed in and prior to setting fixtures.

b. Arrange for a final inspection by the plumbing official to observe the tests specified below and to ensure compliance with the requirements of the plumbing code.

c. Whenever the plumbing official finds that the piping system will not pass the test or inspection, make the required corrections and arrange for re-inspection by the plumbing official.

d. Prepare inspection reports signed by the plumbing official and turn over to the Architect upon completion of the project.

B. Perform one of the following tests on all piping:

1. Air Test:

a. Test piping system with compressed air.

b. Minimum pressure values shall meet or exceed values listed in piping materials schedule.

c. Pressure readings shall be performed with gauges compliant with testing requirements of the International Plumbing Code.

d. After test pressure has been applied for at least specified time minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat test until there are no leaks.

2. Hydrostatic Test:

a. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.

b. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.

c. Isolate expansion tanks and determine that hydronic system is full of water.

d. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

e. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

3. Procedures required by authority having jurisdiction that exceed requirements of tests listed above shall be performed by contractor to obtain system acceptance.

C. Inspect Waste & Vent Piping as follows:

1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved by the authority having jurisdiction.

2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.

a. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.

b. Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to insure compliance with the requirements of the plumbing code.

c. Reinspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for reinspected by the plumbing official.

3. Piping System Test, Test drainage and vent system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows:

    a. Test for leaks and defects all new drainage and vent piping systems and parts of existing systems, which have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.

    b. Leave uncovered and unconcealed all new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose all such work for testing, that has been covered or concealed before it has been tested and approved.

    c. Rough Plumbing Test Procedure: Except for outside leaders and perforated or open jointed drain tile, test the piping of plumbing drainage and venting systems upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water to the point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints for leaks.

    d. Final Plumbing Test Procedure: After the plumbing fixtures have been set and their traps filled with water, their connections shall be tested and proved gas and water-tight. Plug the stack openings on the roof and building drain where it leaves the building, and introduce air into the system equal to a pressure of 1" water column. Use a "U" tube or manometer inserted in the trap of a water closet to measure this pressure. Air pressure shall remain constant without the introduction of additional air throughout the period of inspection. Inspect all plumbing fixture connections for gas and water leaks.

    e. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.

1.5 WATER PIPING AND SPECIALTIES INSTALLATION

A. Provide piping material for use as listed in piping materials schedule shown on plans.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Select system components with pressure rating equal to or greater than system operating pressure.

G. Install groups of pipes parallel to each other spaced to permit application of insulation and servicing of valves.

H. Install drains, consisting of a tee fitting, NPS 0.75” ball valve and short NPS 0.75” threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

I. Install piping at uniform grade of 0.2 percent upward in direction of flow.

J. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

K. Install branch connections to mains using mechanically formed tee fittings in main pipe with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

L. Install unions in piping 2” and smaller, adjacent to valves, at final connections of equipment and at other locations noted on plans.

M. Install flanges in piping 2.5” and larger at final connections of equipment and elsewhere as indicated

N. Install strainers on inlet side of each control valve, pressure reducing valve, solenoid valve, in-line pump and at other locations noted on plans. Install 0.75” nipple and ball valve in blowdown connection of strainers 2” and larger. Match size of strainer blowoff connection for strainers smaller than 2”.

O. Identify piping as specified in Division 22.

P. Do not interrupt service to facilities occupied by owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to the following:

1. Notify Architect no fewer than two days in advance of proposed interruption of service.

2. Do not proceed with interruption of water-distribution service without Architects and owners written permission.

Q. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with Authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.

2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application. Do not install bypass piping around backflow preventers unless directed by local jurisdiction.

R. Connection to Utility Mains

1. Tap utility mains according to requirements of the local utility companies and of size and in location indicated.

1.6 WASTE & VENT PIPING AND SPECIALTIES INSTALLATION

A. Install piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

B. Install horizontal piping as high as possible allowing for proper slope and coordination with other components. Install vertical piping tight to columns or walls. Provide space to permit insulation applications where required, with 1-inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

C. Make changes in direction for drainage and vent piping using appropriate 45 degree wyes, combination wye and eighth bend, or long sweep, quarter, sixth, eighth, or sixteenth bends. Sanitary tees or quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long-turn pattern combination wye and eighth bends where two fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than 90 degrees shall be made. Where different sizes of drainage pipes and fittings are connected, use proper sized standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.

D. Install underground building drains to conform with the plumbing code, and in accordance with the Cast Iron Soil Pipe Institute Engineering Manual. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

E. Install drainage piping pitched down at a minimum slope of 1/8 inch per foot unless otherwise required by International Plumbing Code. Install vent piping pitched to drain back by gravity to the sanitary drainage piping system.

F. Install backwater valves in sanitary building drain piping as indicated, and as required by the plumbing code. For interior installation, provide cleanout cover flush to floor centered over backwater valve cover and of adequate size to remove valve cover for service.

G. Install expansion joints on stacks or horizontal piping as indicated, and as required by the plumbing code.

H. Install above ground cleanouts in above ground piping and building drain piping as indicated, and:

1. as required by plumbing code;

2. at each change in direction of piping greater than 45 degrees;

3. at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping;

4. at base of each vertical soil and waste stack.

I. Install floor and wall cleanout covers for concealed piping, types as indicated.

J. Install floor cleanouts in below floor building drain piping at minimum intervals of 50' for piping 4" and smaller and 75' for larger piping.

K. Install exterior cleanouts as detailed on drawings.

L. Install frost-proof vent caps.

M. Installation of Floor Drains, Floor Sinks and Floor Troughs

1. Install floor drains, floor sinks and floor troughs in accordance with manufacturer's written instructions and in locations indicated.

2. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor. Set floor sinks and floor troughs flush with the level finish floor.

3. Refer to architectural documents for floor slope requirements and set floor drain elevation to match.

4. Provide P-traps for drains connected to the sanitary sewer.

5. Install floor drains, floor sinks and floor troughs in waterproof floors with waterproof membrane securely flashed with drain flashing clamp so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

6. Position drains so that they are level, accessible and easy to maintain.

N. Preparation of Foundation for Underground Sanitary Building Drains

1. Grade trench bottoms to provide a smooth, firm, and stable foundation, free from rock, throughout the length of the pipe.

2. Remove unstable, soft, and unsuitable materials at the surface upon which pipes are to be laid and backfill with clean sand or pea gravel to indicated invert elevation.

3. Pipe Beds:

a. Cast Iron Soil Pipe: Shape bottom of trench to fit bottom of pipe for 90-degrees (bottom 1/4 of the circumference). Fill unevenness with tamped sand backfill. At each pipe joint dig bell holes to relieve the bell of the pipe of all loads, and to ensure continuous bearing of the pipe barrel on the foundation.. For piping with rock trench bottoms, provide sand pipe bed 6” underneath and around sides of pipe, including fittings.

b. Provide backfill above top of pipe bed as required for field conditions. Refer to Division 22 Section "General Plumbing Requirements” for materials and methods for backfill.

O. Pipe Applications - Above Ground, Within Building

1. Install hubless, cast-iron soil pipe and fittings for 15” and smaller soil, waste, and vent pipe.

2. Install PVC Type DWV Plastic pipe and fittings for drainage and vent pipe, except no plastic pipe shall be installed in return air plenums.

3. Install PVC pressure pipe and fittings for sump pump discharge, except no plastic pipe shall be installed in return air plenums.

4. Install ½” type L copper tube for trap primer outlet piping.

P. Pipe Applications - Below Ground, Within Building

1. Install PVC Type DWV Plastic pipe and fittings for drainage and vent pipe for 24” and smaller. Install fabricated fittings for 16 inch and larger.

2. Install ½” type K soft copper tube for trap primer outlet piping.

1.7 STORM WATER PIPING AND SPECIALTIES INSTALLATION

A. Install backwater valves in storm building drain piping as indicated, and as required by the plumbing code. For interior installation, provide cleanout cover flush to floor centered over backwater valve cover and of adequate size to remove valve cover for service.

B. Install expansion joints on stacks or horizontal piping as indicated, and as required by the plumbing code.

C. Above Ground Cleanouts: Install in above ground piping and building drain piping as indicated, and:

1. as required by plumbing code;

2. at each change in direction of piping greater than 45 degrees;

3. at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping;

4. at base of each vertical soil, waste, or storm water stack.

D. Cleanout Covers: Install floor and wall cleanout covers for concealed piping, types as indicated.

E. Floor Cleanouts: Install in below floor building drain piping at minimum intervals of 50' for piping 6" and smaller and 75' for larger piping.

F. Exterior Cleanouts: Install exterior cleanouts embedded in a 18" x 18" x 8" block of concrete, flush with finished grade.

G. Install area drains in accordance with manufacturer's written instructions and in locations indicated.

H. Install area drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.

I. Provide P-traps for drains connected to combined sanitary and storm sewer.

J. Position drains so that they are level, accessible and easy to maintain.

K. Install roof drains at low points of roof areas, in accordance with the roof membrane manufacturer's installation instructions.

L. Install drain flashing collar or flange so that no leakage occurs between roof drain and adjoining roofing. Maintain integrity of waterproof membranes, where penetrated.

M. Position roof drains so that they are accessible and easy to maintain.

1.8 NATURAL GAS PIPING AND SPECIALTIES INSTALLATION

A. Conform to the requirements of NFPA 54 - National Fuel Gas Code.

B. Concealed Locations: As specified below:

1. Inaccessible Above-Ceiling Locations: Install concealed gas piping in inaccessible above-ceiling spaces without valves or unions.

2. Accessible Above-Ceiling Locations: Gas piping may be installed in accessible above-ceiling spaces (subject to the approval of the authority having jurisdiction), whether or not such spaces are used as a plenum. Valves and unions shall not be located in such spaces used as a plenum.

3. In Floors: Install concealed gas piping in concrete floor slabs in an air-tight conduit constructed of Schedule 40 PVC with socket weld joints two pipe sizes larger than the gas pipe served. Extend conduit a minimum of 12” above finish floor and cap air tight at both ends. Vent conduit to the outside with a minimum 2” pipe and terminate with a screened vent cap.

4. Piping In Partitions: Install concealed gas piping in hollow partitions with welded joint (subject to the approval of the authority having jurisdiction) and protect gas piping against physical damage. Install gas piping passing through partitions with no joints or unions inside the partition.

5. Concrete or Masonry Walls: Do not install gas piping in masonry or concrete walls unless specifically noted and detailed on drawings and allowed by authority having jurisdiction.

6. Prohibited Locations: Do not install gas piping in or through a circulating air duct, clothes chute, chimney or gas vent, ventilating duct, dumbwaiter or elevator shaft. This does not apply to accessible above-ceiling space specified above.

C. Fire Barrier Penetrations: Where pipes pass though fire-rated walls, partitions, ceilings, and floors, maintain the fire-rated integrity.

D. Elevated Floor Penetrations of Waterproof Membrane, Interior Penetrations of No-Fire Rated Walls and Concrete Slab on Grade Penetrations: Provide sleeves and seal pipes that pass through waterproof floors, non-fire rated walls, partitions and ceilings or concrete slab on grade. Refer to Division 22 Section "Basic Piping Materials and Methods" for special sealers and materials.

E. Exterior Wall Penetrations: Seal pipe penetrations through exterior wall constructions with sleeves, packing, and sealant.

F. Underground Exterior Wall Penetrations: Seal pipe penetrations through underground exterior walls with sleeves and mechanical sleeve seals. Refer to Division 22 Section "Basic Piping Material and Methods" for additional information.

G. Dirt legs and Sediment Traps: Install a dirt leg at points where condensate and impurities may collect, at the outlet of the gas meter, as close to the inlet of each gas appliance or equipment as possible, and in a location readily accessible to permit cleaning and emptying.

1. Construct dirt legs and sediment traps using a tee fitting with the bottom outlet plugged or capped. Provide a 3" length of pipe and screwed cap for the dirt leg. Use line size pipe for dirt leg, refer to the drawings for sizes. Enter the tee with flow from the top and exit the tee from the side outlet. Install the dirt leg a minimum of 3-1/2" above the roof or floor readily accessible to permit cleaning and emptying.

2. Install line size gas cock, union and dirt leg at each equipment connection; refer to the drawings for sizes. Provide reducers at the equipment connection as required.

H. Use fittings for all changes in direction and all branch connections.

I. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

J. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

K. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

L. Install horizontal piping as high as possible allowing for specified slope and coordination with other components. Install vertical piping tight to columns or walls. Provide space to permit insulation applications, with 1" clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

M. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

N. Install gas piping at a uniform grade of 1/4 inch in 15 feet, upward to risers, and from the risers to the meter, or service regulator when meter is not provided, or the equipment.

O. Make reductions in pipe sizes using eccentric reducer fittings installed with the level side down.

P. Connect branch outlet pipes from the top or sides of horizontal lines, not from the bottom.

Q. Install unions in pipes 2 inch and smaller, adjacent to each valve, and elsewhere as indicated. Unions are not required on flanged devices.

R. Install dielectric unions where piping of dissimilar metals are joined.

S. Install flanges on valves, apparatus, and equipment having 2-1/2 inch and larger connections.

T. Install strainers on the supply side of each control valve, pressure reducing valve, pressure regulating valve, solenoid valve, and elsewhere as indicated.

U. Anchor piping to ensure proper direction of expansion and contraction.

V. Paint Exposed Outdoor Gas Piping with (1) primer coat and (2) finish coats of paint.

1.9 HANGERS AND SUPPORTS

A. Copper and Steel Pipe hangers shall be installed with the following maximum spacing and minimum rod sizes.

1. 0.75" Pipe - Max Span 5' - Minimum Rod Size 3/8"
2. 1" Pipe - Max Span 6' - Minimum Rod Size 3/8"
3. 1.25" Pipe - Max Span 7' - Minimum Rod Size 3/8"
4. 1.5" Pipe - Max Span 8' - Minimum Rod Size 3/8"
5. 2" Pipe - Max Span 8' - Minimum Rod Size 3/8"
6. 2.5" Pipe - Max Span 9' - Minimum Rod Size 1/2"
7. 3" Pipe - Max Span 10' - Minimum Rod Size 1/2"
8. 4" Pipe - Max Span 14' - Minimum Rod Size 5/8"
9. 5" Pipe - Max Span 16' - Minimum Rod Size 5/8"
10. 6" Pipe - Max Span 17' - Minimum Rod Size 3/4"
11. 8" Pipe - Max Span 19' - Minimum Rod Size 3/4"
12. 10" Pipe - Max Span 22' - Minimum Rod Size 7/8"
13. 12" Pipe - Max Span 23' - Minimum Rod Size 7/8"
14. 14" and larger Pipe – Max Span 25' – Minimum Rod Size 1"

B. Plastic piping hangers shall be spaced according to pipe manufacturer's written instructions for service conditions. Avoid point loading and space and install hangers with the fewest practical rigid anchor points.

C. Support vertical piping runs at roof, each floor and at 10 foot intervals between floors.

1.10 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt and debris from inside and outside of pipe and fittings before assembly.

C. Soldered joints: Apply ASTM B813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook." Using lead free solder allow complying with ASTM B 32.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook", "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full interior diameter. Join pipe fittings as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Do not used pipe of pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to ASW D10.12/D10.12M, using qualified processes and welding operators according to specified quality assurance requirements.

G. Flanged Joints: Select appropriate gasket material, size, type and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Plastic Piping Solvent Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following.

1. Comply with ASTM F402 for safe handling practice of cleaners, primers and solvent cements.
2. CPVC piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Pressure Piping: Join schedule 40, 80 and 120 according to ASTM D 2672. Join other-than-schedule number 40, 80 and 120 PVC pipe and socket fittings according to ASTM D 2855.
4. 4.PVC Non-pressure Piping: Join according to ASTM D 2855.

I. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions

J. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings

K. Mechanically Formed, Copper Tube Outlet Joints: Use manufacturer-recommended tool and procedure and brazed joints.

L. Pressure Sealed Joints: Use manufacturer-recommended tool and procedure. Leave insertion marks on pipe after assembly.

M. Copper Tubing: Solder joints in accordance with the procedures specified in AWS "Soldering Manual."

N. Cast-Iron Soil Pipe: Make hubless joints in accordance with the Cast-Iron Soil Pipe & Fittings Handbook, Chapter IV. Install Couplings as followings:

1. Coordinate requirement for heavy duty no-hub couplings with Owner and Architect for installation on sanitary piping 3” and larger. Coordinate with section 3 of this text and general notes.
2. Install hubless couplings complying with CISPI 310 on soil, waste and vent piping.
3. Install hubless couplings complying with CISPI 310 on and soil and waste piping 3” and smaller and all vent piping.
4. Install heavy duty hubless couplings on soil or waste stacks, soil and waste piping connections to soil or waste stacks and all soil and waste piping 5” and larger.
5. Install No-Hub fitting restraints on joints 5” and larger at:
    a. Changes of direction from vertical to horizontal
    b. Branches, including wyes and wye combination fittings 4” and larger
    c. Horizontal changes of direction 22-1/2 degrees and greater

O. PVC DWV Pipe: Joining and installation of PVC drainage pipe and fittings shall conform to ASTM D2665.

P. ABS to PVC Transition Joints: When joining ABS to PVC components (such as an ABS building drain to PVC sewer pipe) make joints using solvent cements conforming to ASTM D3138.

Q. Cast Iron to PVC Below Grade: Join cast iron to PVC with underground shielded adapter couplings.

R. Gas Joint Construction

1. Welded Joints: Comply with the requirements in ASME Boiler and Pressure Vessel Code, Section IX.
2. Brazed Joints: Comply with the procedures contained in the AWS "Brazing Manual."
    a. WARNING: Some filler metals contain compounds which produce highly toxic fumes when heated. Avoid breathing fumes. Provide adequate ventilation.
    b. CAUTION: Remove stems, seats, and packing of valves, and accessible internal parts of piping specialties before brazing.
    c. Fill the tubing and fittings during brazing with an inert gas (nitrogen or carbon dioxide) to prevent formation of scale.

d. Heat joints to proper and uniform temperature.

3. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:

   a. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint. Refer to NFPA 54, for guide for number and length of threads for field threading steel pipe.

   b. Align threads at point of assembly.

   c. Apply appropriate tape or thread compound to the external pipe threads.

   d. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.

   e. Damaged Threads: Do not use pipe with threads which are corroded, or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

4. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

5. Fusion Welded: Joints shall be made by a qualified and approved operator in accordance with Title 49, CFR, Part 192.283 and be made in accordance with pipe manufacturer's recommendations.

6. Semi-rigid Corrugated Stainless Steel Tubing: Joints shall be made by a qualified and approved operator in accordance with pipe manufacturer's recommendations.

1.11 PIPE EXPANSION

A. Provide expansion joints, expansion loops, anchors and guides as required for proper control of expansion and contraction of piping. Piping from mains to equipment branches and risers shall be provided with swing, swivel joints or offsets to relieve stresses due to expansion or contraction of piping.

B. Provide pipe loops as shown on drawings or specified. Where pipe loop dimensions are not shown on plans they shall be as recommended by pipe manufacturer based on thermal expansion.

C. Expansion Joints Specified below shall comply with the following:

   1. Install expansion joints of sizes matching sizes of piping in which they are installed

   2. Install packed type expansion joints with packing suitable for fluid service

   3. Install metal bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturer's Association, Inc."

   4. Install rubber packless joints according to FSA-NMEJ-702.

   5. Install grooved joint expansion joints to grooved-end steel piping.

D. Expansion loops shall comply with the following:

   1. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

E. Alignment guide anchors specified below shall comply with the following:

   1. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.

   2. Install two guides on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.

   3. Install anchors at locations required to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of location and stresses to connected equipment.

1.12 TRAP SEALS

A. Install trap seals in accordance with manufacturer's written instructions and in locations indicated.

B. Make watertight seal using an adhesive type caulk along bottom of trap seal, if required by the manufacturer.

C. Employ a test plug for testing and remove before normal floor drain use. Clean inside of drain tailpiece and install trap seal after testing.

D. Do not touch elastomeric plug or allow contact with primer or solvent cement.

1.13 ADJUSTING AND CLEANING

A. Clean and disinfect water distribution piping as follows:

1. Purge all new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired prior to use.

2. Use the purging and disinfecting procedure proscribed by the authority having jurisdiction or, in case a method is not prescribed by that authority, the procedure described in either AWWA C651, or AWWA C652, or as described below:

a. Flush the piping system with clean, potable water until dirty water does not appear at the points of outlet.

b. Fill the system or part thereof with a water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) the system or part thereof and allow to stand for 24 hours.

c. Drain the system or part thereof of the previous solution and refill with a water/chlorine solution containing at least 200 parts per million of chlorine and isolate and allow to stand for 3 hours.

d. Following the allowed standing time, flush the system with clean, potable water until chlorine residual is lowered to incoming city water level.

e. Submit water samples in sterile bottles to the authority having jurisdiction. Repeat the procedure if the biological examination made by the authority shows evidence of contamination.

3. Prepare disinfection reports signed by the authority having jurisdiction and turn over to the Architect upon completion of the project.

A. Fill the system. Check compression tanks to determine that they are not air bound and that the system is completely full of water.

B. Before operating the system, perform these steps:

1. Close drain valve, hydrants, and hose bibbs.

2. Open valves to full open position.

3. Remove and clean strainers.

4. Check pumps for proper direction of rotation. Correct improper wiring.

5. Lubricate pump motors and bearings.

PART 2 – PRODUCTS

2.1 PIPING

A. Copper Tube:

1. Provide hard temper copper water tubing conforming to ASTM B 88. Tubing shall be type K, L or M as listed in schedule.

2. Tubing joints shall be soldered or brazed as indicated in schedule.

B. DWV Copper Tube:

1. Type M DWV copper tubing shall conform to ASTM B 306, type DWV.

C. ACR Copper Tubing:

1. Provide hard temper nitrogenized copper refrigerant tubing conforming to ASTM B 88. Tube shall be L or K as listed in schedule.

2. Tubing shall be brazed or grooved joints manufactured to copper tube dimensions. Flaring tubing ends to accommodate alternate sized couplings is not allowed.

D. Steel Pipe:

1. Steel pipe shall conform to ASTM A53 and shall be black steel with plain ends. Type, grade and wall thickness shall be as indicated in piping materials schedule.

E. Plastic Pipe:

1. PVC Plastic pipe shall conform to ASTM D 1785. Piping shall be schedule 40 or schedule 80 as listed in schedule.

2. CPVC Plastic pipe shall conform to ASTM F 438 for schedule 40 pipe and ASTM F 439 schedule 80 pipe.

F. Polyethylene (PE) Pipe:

1. Conform to ASTM D 2239, with SIDR numbers 5.3, 7, 9 or 11.5 with PE compound number required to achieve required system working pressure.

2. U-Bend Assembly shall be factory fabricated with embossed depth stamp every 36” from U-Bend.

G. PEX Tube

1. Provide as listed in schedule with crimped joints.

H. Cast-Iron DWV: CISPI 301 and ASTM A888, no-hub pipe.

I. PVC DWV Pipe: Schedule 40 pipe meeting ASTM D1785 and ASTM D2665 with “solid wall” PVC meeting ASTM D1784 with cell class 1245-B.

J. Underground Shielded Adapter Couplings: ASTM C1173 with neoprene adapter gasket with stainless steel shield and stainless steel hose clamp.

2.2 FITTINGS

A. Wrought Copper Fittings:

1. Provide wrought solder joint copper tube fitting conforming to ANSI B 16.22

B. Nickel Copper Alloy Steel Welding Fittings:

1. Provide nickel copper alloy steel welding fittings conforming to ANSI B16.9 and ASTM A234.

C. Steel piping fittings:

1. Wrought Steel Fittings:

a. Provide carbon steel fittings conforming to ASTM A 234/A 2345M with wall thickness to match adjoining pipe.

2. Wrought Cast and Forged Steel Flanges:

a. Fittings shall conform to ASME B 16.5 including bolts nuts and gaskets of material group 1.1. End connections shall be butt welded and facings shall be raised face type.

3. Welded Fittings

a. Fittings shall conform to ASTM A 234, seamless or welded, for welded joints.

i. 1.25” and smaller shall be socket type

ii. 1.5” and larger shall be butt weld type

D. Cast Bronze Fittings:

1. Cast bronze fittings shall be solder joint type conforming to ANSI B 16.18.

E. Plastic piping Fittings:

1. PVC Plastic Pipe

a. Socket type fittings conforming to ASTM D 2466 for schedule 40 and ASTM D 2467 for schedule 80.

2. CPVC Plastic Pipe

a. Socket type fittings conforming to ASTM F 438 for Schedule 40 and ASTM F 439 for Schedule 80.

F. Polyethylene (PE) fittings:

1. Molded PE fittings conforming to ASTM D 2683 or ASTM D 3261 made with PE resin and socket or butt fusion type made to match PE pipe dimensions and class.

G. Cast-Iron DWV Fittings: CISPI 301 and ASTM A888, no-hub fittings.

a. Couplings and compression gaskets, NSF Certified: ASTM C564 and CISPI 310.

b. Heavy duty couplings and compression gaskets: ASTM C1540 and meeting FM 1680.

H. PVC DWV Pipe: Schedule 40 fittings meeting ASTM D1785 and ASTM D2665.

a. Fittings: DWV pattern meeting ASTM D2665 with solvent cement socket joints.

b. Solvent: ASTM D2564

2.3 JOINING MATERIALS

A. Pipe flange gasket materials shall be suitable for chemical and thermal conditions of piing system contents. Provide 1/8” maximum thickness, nonmetallic, flat, asbestos free material conforming to ASME B 16.21.

B. Flange bolts and nuts shall conform to ASME B18.2.1 and shall be carbon steel unless otherwise noted.

C. Plastic pipe flange gasket bolts and nuts shall be type and material recommended by piping system manufacturer.

D. Solder filler metals shall conform to ASTM B 32 and shall be lead free alloys that include water flushable flux according to ASTM B 813.

E. Brazing filler metals shall conform to AWS A 5.8 BCuP series and shall be copper phosphorus alloys for joining copper with copper or Bag-1 silver alloy for joining copper with bronze or steel.

F. Welding filler materials shall comply with ASW D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements for Joining Plastic Pipe:

1. CPVC piping cements shall conform to ASTM F 493.

2. PVC piping solvent cements shall conform to ASTM D 2564. Include primer complying with ASTM F 656.

H. Gasket material thickness, material and type shall be suitable for fluid to be handled and working temperatures and pressures.

2.4 TRANSITION FITTINGS

A. Plastic to Metal Transition Fittings:

1. Provide one piece fitting with one threaded brass or copper insert and one Schedule 80 solvent-cement-joint end.

B. Plastic to Metal Transition Unions:

1. Provide MSS SP-107 union. Include brass or copper end, schedule 80 solvent cement joint end, rubber gasket and threaded union.

2.5 DIELECTRIC FITTINGS

A. Fittings shall be combination fitting of copper alloy and ferrous materials with threaded solder joint plain or weld neck end connections that match piping system materials.

B. Insulating material shall be suitable for system fluid, pressure and temperature

C. Dielectric unions:

1. Provide factory fabricated union assembly with pressure and temperature rating suitable for system operating range.

D. Dielectric Flanges:

1. Provide factory fabricated companion flange assembly with pressure and temperature rating suitable for system operating range.

E. Dielectric Coupling:

1. Provide galvanized steel coupling with inert and non-corrosive thermoplastic lining and threaded ends. Coupling shall have pressure and temperature rating suitable for system operating range.

F. Dielectric Nipples:

1. Provide electroplated steel nipple with inert and noncorrosive, thermoplastic lining, plain, threaded or grooved ends. Nipples shall have pressure and temperature rating suitable for system operating range.

2.6 EXPANSION TANK

A. Tank shall be welded steel rated for 125 PSI working pressure and 375 degree F maximum operating temperature. Tank shall be factory tested with taps fabricated and supports installed and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII Division I.

B. Diaphragm shall be securely sealed into tank to separate air charge from system water to maintain required expansion capacity.

C. Tank shall be equipped with Schrader valve, stainless steel air charge fitting with EPDM seats.

2.7 PACKLESS EXPANSION JOINTS

A. Metal Compensator: Expansion joints shall have 2-ply phosphor bronze bellows, brass shrouds and end fittings for copper piping systems and 2-ply stainless steel bellows, carbon steel shrouds and end fittings for steel piping systems. Expansion compensators shall have internal guides, anti-torque device and removable end clip for proper positioning.

2.8 EXPANSION LOOPS

A. Provide pipe expansion loop constructed of main pipe material. Acceptable methods include use of elbows in a U or Z shape as defined by ASHRAE or ASME; or a detailed stress analysis may be utilized to define areas of expansion.

2.9 ALIGNMENT GUIDES AND ANCHORS

A. Provide steel, factory fabricated alignment guide with bolted two-section outer cylinder and base for attaching to structure; with two section guiding spider for bolting to pipe.

B. Anchors shall be mechanically fastened with tension and shear capacities appropriate for application.

2.10 GAS METERS

A. Diaphragm type:

1. Positive displacement gas meters with aluminum cases, temperature compensated, with internal corrosion-resistant components; threaded ends for 2 inch and smaller, flanged ends for 2-1/2 inch and larger; for gas working pressures, specific gravity, and volume flow indicated.

B. Rotary type:

1. Positive displacement gas meters meeting ASTM B109.3 with aluminum cases with maximum operating pressure of 175 psig, temperature compensated, with sealed mechanical totalizer, internal corrosion-resistant components and oil free design; threaded ends for 1-1/2 inch and smaller, flanged ends for 2 inch and larger; for gas working pressures, specific gravity, and volume flow indicated.

2.11 DRAINAGE WASTE AND VENT SPECIALTIES

A. Cleanouts

1. Floor Cleanouts

a. For Hard Flooring areas provide a cast iron level cleanout assembly with round, adjustable, scoriated, nickel bronze top, and no hub outlet.

b. For Carpeted Flooring areas provide a cast iron floor level cleanout assembly with round, adjustable, scoriated, nickel bronze top and carpet clamping frame, and no-hub outlet.

2. Wall Cleanouts

a. For finished areas provide cast iron cleanout tee and cast iron countersunk plug with chrome round cover and screw.

b. For unfinished areas provide cast iron cleanout tee and cast iron countersunk plug.

B. Floor Drains

1. See plumbing fixture schedule for drain type.

2. All floor drains in finished areas shall have nickel-bronze strainers except at showers where they shall be chrome-plated strainers.

3. Provide each drain that does not have an integral “P” trap with a cast iron “P” trap in connecting piping.

4. See architectural plans for floor drain top elevations and floor drainage.

C. Roof Drains

1. See plumbing fixture schedule for drain type.

2. Roof drain sumps to be insulated.

D. Downspout Nozzles

1. Provide cast bronze body downspout nozzle with loose wall flange.

E. Floor Sinks

1. See plumbing fixture schedule for drain type.

2. See architectural plans for floor sink top elevations and floor drainage.

2.12 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers

1. Provide 1”-3” vacuum breaker as required to match connected piping.

2. Vacuum Breaker shall have a bronze body with threaded connections and bronze finish and be constructed to ASSE 1001 standard.

B. Hose-Connection Vacuum Breakers

1. Vacuum Breaker shall be nonremovable and have a bronze body with manual drain. It shall be threaded for connection to garden hose and be constructed to ASSE1001 standard.

2.13 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers (provide accessories as required)

1. For 2" and smaller applications, backflow preventer shall have Bronze body and be constructed to ASSE 1013 standard for continuous-pressure applications. Backflow preventer shall have threaded end connections and be selected for configuration required by project. Preventer shall be designed for maximum 12psig pressure loss through the middle 1/3 of flow range.

2. For 2.5" and larger applications, backflow preventer shall have Cast Iron or Steel body with FDA approved interior lining and be constructed to ASSE 1013 standard for continuous-pressure applications. Backflow preventer shall have flanged end connections and be selected for configuration required by project. Preventer shall be designed for maximum 12psig pressure loss through the middle 1/3 of flow range.

B. Double-Check Backflow Prevention Assemblies (provide accessories as required)

1. For 2" and smaller applications, backflow preventer shall have Bronze body and be constructed to ASSE 1015 standard for continuous-pressure applications. Backflow preventer shall have threaded end connections and be selected for configuration required by project. Preventer shall be designed for maximum 5psig pressure loss through the middle 1/3 of flow range.

2. For 2.5" and larger applications, backflow preventer shall have Cast Iron or Steel body with FDA approved interior lining and be constructed to ASSE 1015 standard for continuous-pressure applications. Backflow preventer shall have flanged end connections and be selected for configuration required by project. Preventer shall be designed for maximum 5psig pressure loss through the middle 1/3 of flow range.

2.14 THERMOSTATIC MIXING VALVES

A. Mixing valves shall be thermostatically controlled with 125psig pressure rating and be constructed to ADDE 1017 standard. It shall have a Bronze body with corrosion-resistant interior components and a rough bronze finish with threaded connections. Valve shall include manual temperature control, check stops on hot and cold water supplies, and adjustable temperature control handle.

2.15 TRAP GUARDS

A. Smooth, soft, flexible, elastomeric PVC material molded into shape of duck's bill, open on top with curl closure at bottom. The flow of wastewater allows duck's bill to open and adequately discharge to floor drain through its interior. The duck's bill closes and returns to original molded shape after wastewater discharge is complete. Or, smooth, soft, flexible, elastomeric PVC material with a flapper closure. The flow of wastewater allows flapper to open and adequately discharge to floor drain through its interior. The flapper closes and returns to original molded shape after wastewater discharge is complete.

2.16 STRAINERS

A. Y-Pattern Strainers

1. Strainers shall have a minimum pressure rating of 125psig (unless otherwise indicated).

2. 2" and smaller strainers shall have a Bronze body, a stainless steel screen with round perforations, threaded end connections and a drain.

3. 2.5" and larger strainers shall have a Cast Iron body with epoxy coated FDA approved liner, a stainless steel screen with round perforations, flanged end connections and a drain.

2.17 HOSE BIBBS

A. Hose Bibbs shall have a bronze body, replaceable Bronze seat, threaded or soldier-joint inlet, garden hose thread outlet, 125psig pressure rating, integral vacuum breaker and rough bronze finish with keyed operation unless otherwise noted on drawings. Each hose bibb shall be provided with its own operating key.

B. *Recessed* hose bibbs shall be provided as described above and installed in a chrome plated recessed box with operating key.

2.18 WALL HYDRANTS

A. Freeze-proof Wall Hydrants: Wall Hydrants shall have a 125psig operating pressure rating and be designed to ASME A112.21.3M standard for exposed outlet, self-draining operation. Hydrants shall be provided with casing and operating rod of length to match wall thickness and include wall clamp. Hydrants shall have a concealed

outlet with integral vacuum breaker and garden hose threads and they shall be installed in a deep, flush mounting box with cover. Cover and hydrant shall have polished nickel bronze finish.

2.19 ROOF HYDRANTS

A. Freeze Proof Roof Hydrants: Hydrants shall have a 100 psig operating pressure rating. Hydrant shall be equipped with 0.75" threaded hose connection, dual check backflow preventer, rod guide 1.25" galvanized pipe casing, adjustable link for positive lever lock tension, one-piece variable flow plunger with cushion type seal. Hydrant shall automatically drain when shutoff regardless of hose attachment condition. Hydrant shall be repairable from top of unit without removal of hydrant.

2.20 SHOCK ABSORBER

A. Arresters shall be copper tube with piston and designed to ASSE 1010 or PDI-WH 201 standards. Sizes shall be determined by application.

2.21 FIRE HYDRANTS

A. Fire Hydrants: Fire Hydrants shall be subject to compliance with standard requirements, provide a product meeting the requirements of the local jurisdiction having authority and local Fire Department.

2.22 FIRE DEPARTMENT CONNECTIONS

1. Connections shall have cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- high brass sleeve; and round escutcheon plate. Coordinate all requirements with local fire department.

2.23 VALVE BOXES

A. Water Meter Boxes

1. Boxes shall have cast-iron body and cover for water meter, with lettering in cover as required by local authority; and with slotted, open-bottom base section of length to fit over service piping. Base section may be cast-iron, PVC, clay, or other pipe.

A. Concrete Vaults

1. Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.

a. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.

b. Manhole: Traffic rated, iron cover with 24" diameter unless otherwise indicated.

2. Vault shall be equipped with means to drain water as noted on plans. When not indicated on plans, contractor shall provide outlet and drainage path as required for drainage of vault.

B. Protective Vaults

1. Freeze-Protection Enclosures:

a. Insulated enclosure designed to protect aboveground water piping, equipment, or specialties from freezing and damage, with heat source to maintain minimum internal temperature of 40 deg F when external temperatures reach as low as minus 34 deg F.

b. Standard: ASSE 1060.

c. Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.

d. Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.

i. Housing: Reinforced aluminum or fiberglass construction.

ii. Size: Of dimensions indicated, but not less than those required for access and service of protected unit.

iii. Drain opening for units with drain connection.

iv. Access doors with locking devices.

v. Insulation inside housing.

vi. Anchoring devices for attaching housing to concrete base.

vii. Electric heating cable or heater with self-limiting temperature control as shown on drawings.

2. Weather-Resistant Enclosures:

a. Uninsulated enclosure designed to protect aboveground water piping, equipment, or specialties from weather and damage.

b. Standard: ASSE 1060.

c. Class III: For equipment or devices other than pressure or atmospheric vacuum breakers.

d. Class III-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.

i. Housing: Reinforced aluminum or fiberglass construction.

ii. Size: Of dimensions indicated, but not less than those required for access and service of protected unit.

iii. Drain opening for units with drain connection.

iv. Access doors with locking devices.

v. Anchoring devices for attaching housing to concrete base.

3. Enclosure Bases:

a. 4-inch- or 6-inch minimum thickness precast concrete, of dimensions required to extend at least 6 inches beyond edges of enclosure housings. Include openings for piping.

221123 – PUMPS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 DELIVERY, STORAGE AND HANDLING

A. Store pumps in a dry location.

B. Retain protective covers for flanges and protective coatings during storage.

C. Protect bearings and couplings against damage from sand grit and other foreign matter.

D. Comply with pump manufacturer's written rigging instructions.

1.2 INSTALLATION REQUIREMENTS

A. Pumps shall be installed to allow access for maintenance including removal of motors, impellers, couplings and accessories.

B. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

C. Suspend in-line pumps independent of piping. Install continuous thread hanger rods and elastomeric hangers of sufficient size to support pump weight. Fabricate brackets or supports as required.

D. Associated valves shall be the same size as piping connected to pumps.

E. Install suction and discharge pips sizes equal to or greater than diameter of pump nozzles.

PART 2 – PRODUCTS

2.1 IN-LINE CIRCULATION PUMPS

A. Provide pump as shown in pump schedule. Pump shall be designed for horizontal, maintenance free operation suitable for water temperature of system served. Pump shall have ceramic shaft supported by carbon bearings. Bearings shall be lubricated by circulating fluid. Pump body shall be lead free bronze or stainless steel body. Where check valve is specified or detailed on plans, contractor shall have option of providing field installed check valve or optional check valve furnished with pump. Pump motor shall be non-overloading type.

223400 – FUEL-FIRED DOMESTIC WATER HEATERS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL

A. Provide concrete bases/housekeeping pads as shown on drawings sized for commercial water heaters.

1.2 QUALITY ASSURANCE

A. UL Standards: Provide water heaters complying with the following:

1. UL 778, "Motor Operated Water Pumps."

B. ASHRAE Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

C. NSF Standards: Provide water heaters complying with NSF No. 5, "Standard for Hot Water Generating Equipment for Food Service Establishments using Spray Type Dishwashing Machines," and bearing NSF label.

D. Electrical Component Standard: Provide components complying with NFPA 70 "National Electrical Code."

E. Listing and Labeling: Provide water heaters that are listed and labeled.

1. The terms "listed" and "labeled" shall be as defined in the National Electrical Code, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

F. Provide water heaters that bear the label of the American Gas Association.

G. Provide water heaters and safety relief valves that comply with ASME Boiler and Pressure Vessel Code and that bear the appropriate code symbols.

H. Provide rated water heaters, safety relief valve, gas train and accessories that comply with the state boiler code in effect.

I. The drawings indicate types and capacities of water heaters and are based on specific descriptions and manufacturers indicated. Water heaters having equal performance characteristics by other manufacturers may be considered provided that deviations in capacities, dimensions, operation, or other characteristics are minor and do not change the design concept or intended performance as judged by the Architect. Burden of proof for equality of water heaters is on the proposer.

J. Commercial, Gas Fired, Storage Water Heaters Warranty:

1. Storage Tank – Three Years

2. Controls and Other Components – One Year

1.3 WATER HEATER INSTALLATION

A. Install water heaters on concrete equipment bases. Set and connect units in accordance with manufacturer's written installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer’s recommended clearances. Orient so controls and devices needing servicing are accessible.

B. Install thermometers on water heater outlet piping.

C. Install gas-fired water heaters in compliance with NFPA 54, “National Fuel Gas Code.”

1.4 EXPANSION TANK INSTALLATION

A. Support expansion tank from structure. Do not hang expansion tank from piping.

B. Charge expansion tank bladder with air to a pressure equal to the domestic water static pressure.

1.5 CONNECTIONS

A. Piping installation requirements are specified in other Sections of Division 22. The Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping adjacent to equipment arranged to allow servicing and maintenance.
2. Connect hot and cold water piping to units with shutoff valves and unions. Connect hot water circulating piping to unit with shutoff valve, check valve, and union. Extend relief valve discharge to closest floor drain.
    a. Where water heater piping connections are dissimilar metals, make connections with dielectric fittings or dielectric unions.
    b. Install vacuum relief valve in cold water inlet piping.
3. Connect gas supply piping to burner with drip leg, tee, gas cock, and union; minimum size same as inlet connection. Arrange piping to allow unit servicing.
4. Install vent piping from gas train pressure regulators and valves to outside the building. Terminate vent piping with brass screened vent cap fitting. Do not combine vents except with approval of local authority.
    a. Install gas pressure regulators where indicated.
5. Install drain as indirect waste to spill into open drain or over floor drain.
    a. Install drain valve at low point in water piping, for water heaters not having tank drain.
6. Connect oil piping to oil burner with shutoff valve and union in supply, and check valve and union in return. Arrange piping to allow unit servicing.

B. Electrical Connections:
1. Power wiring is specified in Division 26
2. Field-installed disconnects are specified in Division 26
3. Grounding: Connect unit components to ground in accordance with the National Electrical Code.

C. Connect gas-fired water heater draft hood to the vent system. Unless otherwise indicated provide vent same size as outlet on heater. Comply with gas utility requirements.
1. Vents are specified in Division 23
2. Vent Connections for Sealed Combustion Tank Type Gas Fire Water Heaters:
    a. Install PVC combustion air and vent pipes with factory furnished vent and intake kits per the manufacturer's published installation instructions.
    b. Provide 0.75" PVC indirect drain from PVC exhaust elbow fitting indirect drain connection furnished with water heater. Provide ¾" PVC P-trap with minimum 1" trap seal and route indirect drain to nearest floor drain, discharge to floor drain with air gap.

PART 2 PRODUCTS

2.1 SEALED COMBUSTION GAS-FIRED CONDENSING TANK TYPE WATER HEATERS

A. Sealed combustion gas-fired tank type with submerged combustion chamber, glass lined heat exchanger coil, ASME labeled, 150-psig-rated tank, fan assisted combustion with exhaust fan, hot surface ignition system with flame monitoring system, magnesium anode, integral thermostats and controls, and temperature & pressure relief valve. Low NOx burner meeting SCAQMD Rule 1146.2.

B. Fuel Type shall be as noted on plans.

C. Glass-lined steel tank, with anode rods and drain valve.

D. Automatic gas shutoff device to shut off entire gas supply in event of excessive temperature in tank.

E. Adjustable surface mounted thermostat, intermittent electronic ignition and flue damper control.

F. Temperature and Pressure Relief Valve: ASME rated and labeled.

G. Vacuum Relief Valve: ANSI Z21.22.

H. Vent and Intake Piping: Factory vent and intake kits with Schedule 40 PVC Type DWV Pipe and Fittings: ASTM D2665 pipe and fittings, with solvent cemented joints; DWV plastic fitting patterns shall conform to ASTM D2665 and PVC solvent shall meet ASTM D2564.

I. Where required by sequence of operation and for coordination with building management system, provide normally closed dry contacts for enabling and disabling water heater with front end building automation system

J. Provide water heater accessories as required to execute design shown on drawings

1. Water heater stands
2. Water heater mounting brackets
3. Drain Pans
4. Shock absorbers

2.2 THERMAL EXPANSION TANKS

A. Provide size and number as indicated; construct of welded carbon steel ASME labeled for150 psig working pressure, 375 deg F maximum operating temperature. Separate air charge from system water to maintain design expansion capacity, by means of a FDA approved butyl rubber diaphragm securely sealed into tank. Provide taps for pressure gauge and air charging fitting, and drain fitting. Support vertical tanks with steel legs or base. Tank, with taps and supports, shall be constructed, tested, and labeled in accordance with ASME Pressure Vessel Code, Section VIII, Division 1.

224000 – PLUMBING FIXTURES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL

A. Provide plumbing fixtures and trim, fittings, other components, and supports as specified on the drawings and below.

B. Install supports for plumbing fixtures in accordance with categories indicated, and of type required:

1. Carriers for following fixtures:

a. Wall-hanging water closets.

b. Wall hanging lavatories

c. Wall hanging electric water coolers and drinking fountains.

d. Wall-hanging fixtures supported from wall construction.

2. Chair carriers for the following fixtures:

a. Wall-hanging urinals.

b. Wall-hanging lavatories and sinks.

c. Wall-hanging drinking fountains and electric water coolers.

3. Heavy-duty chair carriers for the following fixtures:

a. Fixtures where specified.

4. Reinforcement for the following fixtures:

a. Floor-mounted lavatories required to be secured to wall.

b. Floor-mounted sinks required to be secured to wall.

c. Recessed, box-mounted electric water coolers.

d. Wall mounted and mop sink faucets.

e. Urinal flush valve solid pipe ring supports.

1.2 SPARE PARTS

A. Deliver spare parts to Owner. Furnish spare parts described below matching products installed, packaged with protective covering for storage, and identified with labels clearly describing contents.

B. Faucet Washers, Cartridges and O-rings: Furnish quantity of identical units not less than 5 percent of amount of each installed with a minimum of 1

C. Flushometer Repair Kits: Furnish quantity of identical units not less than 10 percent of amount of each flushometer installed with a minimum of 1

D. Provide individual metal boxes or a hinged-top wood or metal box having separate compartments for each type and size of above extra materials.

E. Water Closet Tank Repair Kits: Furnish quantity of identical flush valve units not less than 5 percent of amount of each type installed with a minimum of 1.

I. Waterless Urinal Sealant & Cartridges: Furnish quantity of sealant and manufacturer approved cleaner per waterless urinal not less than amount for one year of operation per the manufacturer's recommended maintenance schedule. For cartridge type waterless urinals, furnish quantity of cartridges per waterless urinal not less than the amount for one year of operation per manufacturer's recommended maintenance schedule.

1.3 QUALITY ASSURANCE

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

C. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings and controls.

D. Operate and adjust disposers, hot water dispensers, and controls. Replace damaged and malfunctioning units and controls.

E. Adjust water pressure at drinking fountains, electric water coolers, and faucets, shower valves and flush valves having controls, to provide proper flow and stream.

F. Adjust all flush valve diaphragms as required to ensure single closing action is achieved without inducing any vibration or water hammer in supply piping system.

G. Replace washers of leaking and dripping faucets and stops.

H. Clean fixtures, fittings, and spout and drain strainers with manufacturers' recommended cleaning methods and materials.

I. Adjust faucet wrist blade handles perpendicular to the spout while in the closed position.

J. Set the shower valve temperature limit stop to 110deg F. Perform work after the shower head is installed and the domestic water heater is in operation. Allow the hot water to run for 5 minutes minimum or until temperature reaches equilibrium. Allow cold to run for 5 minutes minimum or until temperature reaches equilibrium.

1.4 INSTALLATION OF PLUMBING FIXTURES

A. Install plumbing fixtures level and plumb, in accordance with fixture manufacturers' written installation instructions, roughing-in drawings, and referenced standards.

B. Install floor-mounted, floor-outlet water closets with closet flanges and gasket seals.

C. Install floor-mounted, back-outlet water closets with fittings and gasket seals.

D. Install wall-hanging, back-outlet water closets with support manufacturer's tiling frame or setting gauge.

E. Install wall-hanging, back-outlet urinals with gasket seals.

F. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.

G. Fasten floor-mounted fixtures and special fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.

H. Fasten wall-mounted fittings to reinforcement built into walls.

I. Fasten counter-mounting-type plumbing fixtures to casework.

J. Secure supplies behind wall or within wall pipe space, providing rigid installation.

K. Install stop valve in an accessible location in each water supply to each fixture.

L. Install trap on fixture outlet except for fixtures having integral trap.

M. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork. Use deep pattern escutcheons where required to conceal protruding pipe fittings.

N. Seal fixtures to walls, floors, and counters using a sanitary-type, one-part, mildew-resistant, silicone sealant in accordance with sealing requirements specified in joint sealant specification section. Match sealant color to fixture color.

O. Install insulation kits on ADA compliant sink and lavatory waste, continuous wastes, hot and cold water supplies where indicated on the drawings and as required by the ADA.

P. Shower Heads: Shower head and hand showers shall be installed so that water discharges parallel to shower door/curtain unless otherwise noted. Coordinate locations with architectural plans. Contractor shall notify A/E in the event of a conflict between architectural details and door opening.

1.4 CONNECTIONS

P. Piping installation requirements are specified in other sections of Division 22. The Drawings indicate general arrangement of piping, fittings, and specialties. The following are specific connection requirements:

1. Install piping connections between plumbing fixtures and piping systems and plumbing equipment specified in other sections of Division 22.

2. Install piping connections indicated between appliances and equipment specified in other, direct connected to plumbing piping systems.

PART 2 – PRODUCTS

2.1 PLUMBING FIXTURES

A. See Plumbing Fixture Schedule on plans for all product requirements.

2.2 PLUMBING FIXTURE SUPPORTS

A. ASME A112.6.1M, categories and types as required for wall-hanging fixtures specified, and wall reinforcement.

B. Support categories are:

1. Carriers: Supports for wall-hanging water closets and fixtures supported from wall construction. Water closet carriers shall have an additional faceplate and coupling when used for wide pipe spaces. Provide tiling frame or setting gauge with carriers for wall-hanging water closets.

2. Chair Carriers: Supports with steel pipe uprights for wall-hanging fixtures. Urinal chair carriers shall have bearing plates.

3. Chair Carriers, Heavy Duty: Supports with rectangular steel uprights for wall-hanging fixtures.

4. Reinforcement: 2-inch by 4-inch wood blocking between studs or 1/4-inch by 6-inch steel plates attached to studs, in wall construction, to secure floor-mounted and special fixtures to wall.

C. Support Types: Provide support of category specified, of type having features required to match fixture.

D. Provide supports specified as part of fixture description, in lieu of category and type requirements above.

2.3 INSULATION KITS

A. Insulation kits for lavatory and sink waste and supplies of vinyl plastic with reusable fasteners and openings for access to supply stop handles.

230500 – COMMON WORK RESULTS FOR HVAC

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 CODE SECTIONS

A. 2012 International Mechanical Code

B. 2012 International Building Code

C. 2012 International Plumbing Code

D. ADA – American Disabilities Act

E. ANSI – American National Standards Institute

F. ASHRAE – American Society of Heating Refrigerating and Air Conditioning Engineers

G. ASTM – American Society of Testing Materials

H. NFPA – National Fire Protection Association

I. NEMA – National Electrical Manufactures Association

J. OSHA – Occupational Safety and Health Act

K. UL – Underwriter's Laboratories

L. SMACNA – Sheet Metal Air Conditioning National Association

M. All codes listed on architectural Code Reference Sheet or project cover sheet.

1.2 GENERAL

A. Provide all work in accordance with applicable codes, rules, ordinances, and regulations of local, State, and Federal Governments and other Authorities Having Jurisdiction (AHJ).

B. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the drawings and specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system functioning as indicated by the design and the equipment specified. Elements of the work include materials, supervision, supplies, equipment, transportation, and utilities.

C. The drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The contractor shall use the drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system. Plans shall not be scaled

D. Contractor shall coordinate with all other trades to ensure that all required project components are included in project bid.

E. If in any case the plans or specifications conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

F. If in any case the plans or specifications conflict with themselves, the most stringent of the conflicting information shall be the basis for bid. Contractor shall seek clarification of all conflicts prior to bid.

G. All change order requests shall be accompanied with itemized tabular breakdown of all materials and labor associated with installation of all associated materials for review of the design team. Lump sum pricing will not be accepted.

H. Contractor shall refer to each drawing and specification section in construction document set. No bids shall be submitted without review of all construction documents.

I. Contractor shall provide heat trace cable for all condensate drains located in attics, through exterior walls or any other areas subject to freezing temperatures.

J. Contractor shall provide heat trace cable for all piping installed in areas subject to freezing temperatures.

K. All pipe sizes indicated in this specification are nominal pipe sizes (NPS).

1.3 ALLOWABLE MANUFACTURERS

A. Allowable manufactures for all products listed in division 23 are listed on “Schedule of Manufacturers” on plans.

1.4 SUBMITTAL REQUIREMENTS

A. Submittals for products in division 23 shall include the following items.

1. Product data showing type, model and construction characteristics of product

2. Layout drawings for any systems requiring interconnection of various system components

3. All other documentation required to show compliance with the specifications.

B. Contractor shall allow a minimum of ten working days for design team of review of submittals.

1.5 WARRANTY REQUIREMENTS

A. Unless noted elsewhere in the specifications, all work shall be warrantied for a period of not less than one year from the date of substantial completion. The contractor shall provide work at no additional cost to correct any deficiencies in their work that were identified to have been present during the warrantied period.

1.6 DEMOLITION

A. Where demolition work is required contractor shall disconnect, demolish and remove HVAC systems, equipment and components indicated to be removed.

B. All patching of ductwork and piping shall be performed with materials matching existing conditions and reinsulated to maintain performance of previous conditions.

C. All equipment to be removed and reinstalled shall be disconnected, with services capped, cleaned and stored for reconnection.

D. Owner shall have first right of refusal for all materials being removed.

E. If pipe, insulation, or equipment to remain is damaged or unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

1.7 INSTALLATION

A. All equipment in division 23 shall be installed according to manufacturer’s requirements and minimum code requirements. If an any case the plans or specifications are in conflict with either manufacturer’s requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

B. Apply firestopping to penetrations of fire rated floor and wall assemblies for electrical installations to restore original fire resistance rating of assembly.

C. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

D. If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements. Contractor shall coordinate scope of work with fire sprinkler system installation where applicable to ensure no sprinkler piping is installed in a fashion that will limit installation height of ductwork.

E. Install all equipment to facilitate service, maintenance and repair or replacement of components of both mechanical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

1.8 EXECUTION REQUIREMENTS

A. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

PART 2 – PRODUCTS

2.1 HOUSEKEEPING PADS

A. All equipment shall be installed on concrete housekeeping pads. Pad shall extend beyond equipment perimeter 4" and shall elevate equipment off of finish floor 4".

B. Contractor shall have option to provide prefabricated housekeeping pad or pour pad in place.

2.2 SLEEVES

A. Sleeves shall be constructed from the following materials at contractor's option.

1. Galvanized steel round tubing, closed with welded longitudinal joint.
2. Schedule 40 Steel Pipe.
3. DUCTED RETURN ONLY – Schedule 40 PVC pipe.

2.3 DIELECTRIC FITTINGS

A. Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Dielectric Unions: Factory-fabricated, union assembly, for 250 psig minimum working pressure at 180 deg F.

C. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for minimum working pressure as required to suit system pressures.

D. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300 psig minimum working pressure at 225 deg F.

E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300 psig minimum working pressure at 225 deg F.

2.4 GROUT

A. ASTM C 1107, grade B, nonshrink and nonmetallic, dry hydraulic-cement grout

B. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

C. Design Mix: 5000 psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

230519 – METERS AND GAUGES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION

A. Install connector plugs with socket extending one-third of pipe diameter and in a vertical position in piping.

B. Install connector plugs of sizes required to match thermometer connectors. Provide bushings if required to match sizes.

C. Provide extension of thermowells as required for access beyond piping insulation.

D. Install thermometers in thermowells and adjust position for readability.

E. Install meters and gauges adjacent to machines and equipment to allow service and maintenance of meters, gauges, machines and equipment.

F. After installation calibrate meters according to manufacturer's written instructions.

1.2 SCALE

A. Provide scale range of meters and gauges as required for flow rates indicated on drawings and schedules.

PART 2 – PRODUCTS

2.1 BIMETALLIC DIAL THERMOMETER

A. Thermometer shall have stainless steel case and stem, glass window, permanently etched scale markings on dial, dark metal pointer and bimetal coil temperature sensing element.

B. Provide probe suitable for insertion in connector plug with length as required for insertion into gauge connector plug.

C. Thermometer shall have accuracy of plus or minus one percent of scale range.

D. Provide each thermometer with separable well for installation pipe connections.

2.2 THERMOWELL

A. Thermowell shall be constructed in accordance with ASME B40.200 with pressure-tight, socket-type fitting made for insertion into piping tee fitting. Length shall match thermometer bulb or stem and extensions shall be provided to accommodate insulation.

B. Provide thermowell bushings as required to convert internal screw thread to size of thermometer connection.

2.3 PRESSURE GAUGES

A. Pressure gauge shall have stainless steel case and stem, glass window, permanently etched scale markings on dial, dark metal pointer and bourdon type pressure element assembly with copper alloy construction and brass tip.

B. Gauge shall be equipped with mechanical link between pressure element and connection to pointer.

C. Provide probe assembly suitable for insertion in connector plug.

D. Gauge shall have grade 'A' accuracy plus or minus one percent of middle half of scale range.

2.4 TURBINE FLOW METERS

A. Provide impeller turbine type flow meter for installing in piping and measuring flow directly in gallons per minute

B. Display shall show rate of flow with register to indicate total volume in gallons.

C. Accuracy shall be plus or minus 1.5 percent of actual water flow.

D. Provide meter suitable for gas or fluid conveyed through piping system in which meter is installed.

2.5 CONNECTOR PLUGS

A. Provide connector plugs for all pressure gauges and thermometers rated for 500 psi and 200 degrees Farenheit. Plug shall be solid brass construction with two valve cores of neoprene.

230523 – VALVES FOR HVAC PIPING

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Prior to installation, examine valve interior for cleanliness. Operate valves to ensure proper operation. Examine guides, seats, threads and flanges to ensure there are no conditions that could cause valve malfunction or leakage. Do no attempt to repair defective valves; replace with new valves.

B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance and equipment removal without system shutdown. Locate valves for easy access and provide separate support where necessary.

C. Install valves in position to allow full stem movement. Install valves in horizontal piping with stem at or above center of pipe.

D. Install chain wheels on operators for valves 4” and larger and more than 96 inches above finished floor. Extend chains to 60 inches above finished floor.

E. Install necessary valves within piping systems to provide required flow control and to allow isolation for inspection, maintenance and repair of each piece of equipment of fixture and on each main and branch service loop.

F. Valves 2” and smaller have solder, socket weld flanged or screwed end connections as required by associated piping materials unless otherwise noted. Valves 2.5” and larger shall have flanged or butt weld ends as scheduled.

G. Non-rising stem valves shall not be installed at any point in the piping systems unless space is restricted. If a restricted area is identified, contractor shall obtain A/E approval before installation of non-rising stem valve.

H. Valves shall be the same size as adjacent piping. Reduced valve size will not be allowed unless specifically noted.

I. Provide 2.5” and larger gate valves on steam supply line with by-pass valves. Bypass valves shall have same trim as is specified for main valve.

J. Provide butterfly valves 6” and smaller with latch lock handles for shutoff service.

K. Install globe valves with pressure on top of disc unless prohibited by code. Globe valves requiring drainage for inspection, maintenance or winterization shall be installed with stem in horizontal position to allow complete drainage of piping.

1.2 GENERAL VALVE APPLICATIONS

A. If valve applications are not noted, use the following:

1. Shutoff service: Ball, Butterfly or Gate valves

2. Throttling Service: Balance Valves or butterfly valves

B. Valves in Insulated Piping: (shall be provided with 2” stem extensions and the following)

1. Gate Valves shall be provided with rising stem

2. Ball Valves shall be provided with an extended operating handle of non-thermal-conductive material and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

3. Butterfly Valves shall be provided with extended neck

1.3 CHILLED WATER, HOT WATER AND CONDENSER VALVE APPLICATION

A. 2” and smaller:

1. Shutoff: Bronze Ball Valve

2. Balance: Bronze Circuit Setter

3. Check: Bronze Swing Check Valve

4. Automatic Flow Control: Bronze Automatic Flow Control Valve

B. 2.5" and larger:

1. Shutoff: Iron Single Flange Butterfly (Provide valves for sizes as indicated in Part 2 "Products")
2. Balance: Iron Circuit Setter
3. Check: Iron Swing Check Valve with Closure Control
4. Automatic Flow Control: Iron Automatic Flow Control Valve

1.4 STEAM AND CONDENSATE VALVE APPLICATION:

A. 2" and smaller:

1. Shutoff: Bronze Gate Valve
2. Check: Bronze Swing Check Valve
3. Throttling: Bronze Globe Valve

B. 2.5" and larger:

1. Shutoff: Iron Gate Valve
2. Check: Iron Swing Check Valve
3. Throttling: Iron Globe Valve

PART 2 – PRODUCTS

2.1 BALL VALVES

A. Bronze Ball Valve: Valve shall conform to standard MSS SP-110. Body design shall be two piece, bronze with threaded ends, stainless steel ball and stem, Teflon seats and full porting.

2.2 BUTTERFLY VALVES

A. Iron Single Flange Butterfly Valve (2.5" to 12"): 200 CWP rated. Valve shall conform to MSS SP-67, Type I. Body design shall be lug type suitable for bi-directional dead-end service at rated pressure without use of downstream flange. Body material shall be ASTM A 126, cast iron or ASTM A 536 ductile iron. Valve shall be equipped with EPDM seat, stainless steel stem and aluminum bronze disc.

B. Iron Single Flange Butterfly Valve (14" to 24"): 150 CWP rated. Valve shall conform to MSS SP-67, Type I. Body design shall be lug type suitable for bidirectional dead end service at rated pressure without use of downstream flange. Body material shall be ASTM A 126 cast iron or ASTM A 536 ductile iron. Valve shall be equipped with EPDM seat, stainless steel stem and aluminum bronze disc.

2.3 GATE VALVES

A. Iron Gate Valve: Class 125, OS&Y valve. Conform to standard MSS SP-70, Type I. Body material shall be ASTM A 126, gray iron with bolted bonnet. Valve shall be equipped with flanged ends, bronze trim, solid wedge disc and asbestos free packing and gasket. Valve shall be designed for repacking under pressure when fully opened and back-seated.

B. Bronze Gate Valve: Class 150, rising stem valve. Conform to MSS SP-80, Type 2. Body material shall be ASTM B 62 bronze with integral seat and union ring bonnet. Valve shall be equipped with threaded ends, bronze stem, solid wedge bronze disc, asbestos free packing and malleable iron hand wheel. Valve shall be designed for repacking under pressure when fully opened and back-seated.

2.4 GLOBE VALVES

A. Bronze Globe Valve: Class 125 Valve. Conform to MSS SP-80, Type I. Body material shall be ASTM B 62 bronze with integral seat and screw in bonnet. Valve shall be equipped with threaded ends, bronze stem and disc and asbestos free packing. Valve shall be designed for repacking under pressure when fully opened and back-seated.

B. Iron Glove Valve: Class 125 Valve. Conform to MSS SP-85, Type I. Body Material shall be ASTM A 126, gray iron with bolted bonnet. Valve shall be equipped with flanged ends, bronze trim and asbestos free packing and gasket. Valve shall be designed for repacking under pressure when fully opened and back-seated.

2.5 BALANCE VALVES

A. Bronze Circuit Setter Balance Valve: Body material shall be bronze. Valve shall be equipped with precision machined orifice calibrated position indicator, meter connections with built in flanged check valves. Provide complete with polyurethane insulation cover.

B. Iron Circuit Setter Balance Valve: Body material shall be cast iron. Valve shall be equipped with bronze disc with EPDM insert, stainless steel stem, asbestos free packing and gasket, EPDM seal ring and zinc plated stainless steel bushing.

2.6 AUTOMATIC FLOW CONTROL VALVES

A. Brass Flow Control Valve: Body material shall be brass with electroless nickel and steel wear surfaces. Valve shall be equipped with stainless steel spring, built in strainer, pressure and temperature ports, shut off valve with Teflon packing and polyurethane insulation cover.

B. Iron Automatic Flow Control Valve: Body material shall be ductile iron with electroless nickel and steel wear surfaces with stainless steel spring and pressure and temperature ports.

2.7 SWING CHECK VALVES

A. Bronze swing Check Valve: Class 150 valve. Conform to standard MSS SP-80, Type 3. Valve shall have horizontal flow body design with threaded ends and bronze disc. Body material shall be ASTM B 62 bronze.

B. Iron Swing Check Valve with Closure Control: Class 125 valve. Conform to standard MSS SP-71, Type I. Valve shall have full waterway design and shall be constructed with ASTM A 126 gray iron and bolted bonnet. Valve shall be equipped with flanged ends, bronze trim, asbestos free gasket and factory installed exterior lever and swing closure control.

230529 – HANGERS, SUPPORTS AND VIBRATION ISOLATION FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Design seismic restraint hangers and supports for piping and equipment. Obtain approval from authorities having jurisdiction where required by local requirements.

1.2 INSTALLATION OF HANGERS AND SUPPORTS

A. Install hangers, supports, clamps and attachments to support piping properly from building structure. Do not attached to ceilings, equipment, ductwork, conduit or other non-structural elements such as floor or roof decking.

B. Hangers, supports, clamps and attachments shall comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacing specified within Division 23 piping sections. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe as specified above for individual pipe hangers.

C. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length specified in Division 23 piping sections. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping as specified in Division 23 piping sections. Install concrete inserts before concrete is placed; fasten insert to forms. Where concrete with compressive strength less than 2,500 psi is indicated, install reinforcing bars through openings at top of inserts.

D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Provide two nuts on threaded supports to securely fasten the support.

E. Field fabricated heavy duty steel trapeze supports shall be fabricated from steel shapes selected for loads required. Weld steel in accordance with AWS D-1.1.

F. Install appropriate types of hangers and supports to allow control movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.

G. Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

H. Install hangers to provide indicated pipe slopes and so that maximum deflection of piping allowed by ASME B31.9 is not exceeded.

I. Insulated piping:

1. Riser Clamps: Attach riser clamps, including spacers, to piping with riser clamps projecting through insulation. Do not exceed pipe stresses allowed by ASME B31.9. Do not use riser clamps to support horizontal, insulated piping. Seal insulation for hot piping and protect vapor barrier for cold piping as specified in Division 23 “HVAC Insulation”.

2. Insulation protection shield: Install insulation protection shield and high density insulation, sized for the insulation thickness used as specified in insulation schedule. Install a minimum 8” long section at each support point, top and bottom halves or the pipe of same thickness of insulation used.

J. Pre-engineered Support Strut Systems: Channel strut systems can be used at the Contractors option in lieu of individual hangers for horizontal pipes. Space channel strut systems at the required distance for the smallest pipe supported. Provide channel gauge and hanger rods per the manufacturer’s recommendations for the piping supported. Where strut systems are attached to walls, install anchor bolts per manufacturer’s recommendations.

1. Uninsulated copper pipe: Install with plastic galvanic isolators.

2. Insulated Tube or Pipe: Install with 360 degree insulation protection shields or pre-engineered thermal hanger shield inserts.

1.3 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ASME B 31.9 and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ASME B 31.9 and with AWS Standards D1.1.

C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to control movement to compensators.

D. Anchor spacing: Where not otherwise indicated, install anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

1.4 INSTALLATION OF PIPE ALIGNMENT GUIDES

A. Install pipe alignment guides on piping that adjoins expansion joints as required by expansion joint manufacturer and elsewhere as indicated on plans and specification sections to eliminate binding and torsional stress on piping systems. Where not otherwise indicated, install guides as required by ASME B 31.9. Anchor guides to building substrate.

1.5 EQUIPMENT SUPPORTS

A. Fabricate structural steel supports to suspend equipment from structure above or support equipment from floor. Place grout under supports for piping and equipment.

1.6 INSTALLATION OF VIBRATION ISOLATORS

A. Mount mechanical equipment on vibration isolators as specified. Isolator manufacturer shall supply all unit isolators, complete rails, fan and motor bases as required, except for isolation system supplied for equipment by equipment manufacturer

B. Wherever rotational speed is the disturbing frequency (i.e. fans and pump impellers) the lowest such speed in the system shall be used. Isolation devices shall be selected for uniform deflections accounting for distribution of equipment weight.

C. Piping runs connected to equipment requiring vibration isolation shall be isolated from building structure at connection to equipment using isolators inserted in supporting piping rods.

D. Contractor shall have option to use isolation equipment custom designed by equipment manufacturer provided that the proposed equipment meets or exceeds all standards outlines in this specification.

1.7 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Clean all welds and touch up paint to match factory finish of all materials or color and finish of adjacent materials when supports and adjacent elements are painted.

C. Adjust vibration isolators after piping system is at operating weight.

D. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

E. Adjust active height of spring isolators and adjust restraints to permit free movement of equipment within normal mode of operation.

PART 2 – PRODUCTS

2.1 STEEL PIPE HANGERS AND SUPPORTS

A. Comply with MSS SP-58 types 1-58 factory fabricated components. Hangers shall be pre-galvanized or hot dipped. Where non-metallic coatings area indicated provide plastic coating, jacket or liner.

B. Where hangers are installed in a corrosive environment or outdoors, hangers and supports shall be type 304 stainless steel.

2.2 TRAPEZE PIPE HANGERS

A. Trapeze hangers shall comply with MSS SP-69 and shall be type 59 shop or field fabricated pipe support assembly made from structural steel shapes with MSS SP-58 hanger rods, nuts, saddles and U-bolts.

2.3 THERMAL HANGER SHIELD INSERTS

A. Inserts shall have 100 PSI minimum compressive strength and shall be encased in sheet metal shield.

B. For trapeze and clamped systems, insert and shield shall cover entire circumference of pipe.

C. For clevis hangers, insert and shield shall cover lower 180 degrees of pipe.

D. Insert length shall extend 2” beyond sheet metal shield for piping operating below ambient air temperature.

2.4 EQUIPMENT SUPPORTS

A. Provide welded, shop or field fabricated equipment supports made from structural steel shapes.

2.5 PIPE STANDS

A. Pipe stands shall be shop or field fabricated assemblies made of manufactured corrosion resistant components to support roof mounted piping. Provide one piece plastic unit with integral rod roller, pipe clamps or V-Shaped cradle to support pipe. Pipe stand shall be suitable for roof installation without membrane protection.

2.6 VIBRATION ISOLATORS

A. Pads: Pads shall be arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized steel baseplates and factory cut to sizes that match requirements of supported equipment.

B. Mounts: Mounts shall be double deflection type with molded oil resistant rubber, hermetically sealed compressed fiberglass or neoprene isolator elements with factory drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Identify capacity range by color coding or other means.

C. Free Standing Spring Isolators: Free standing spring isolators shall be laterally stable, open spring isolators. Outside diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Minimum additional travel shall be 50 percent of the required deflection at rated load. Isolators shall be capable of supporting 200 percent of the rated load, fully compressed without deformation or failure. Provide factory drilled baseplates and top plates for bolting to equipment and structure.

D. Housed Spring Mounts: Housed spring isolators shall be equipped with ductile iron or steel housing. Mounts shall be equipped with vertically adjustable snubbers allowing 1/4” travel up or down before contacting a resilient collar. Base and top shall have factory drilled holes for bolting to equipment and structure.

E. Elastomeric Hangers: Elastomeric Hangers shall be single or double deflection type fitted with molded, oil resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Identify capacity range by color coding or other means.

F. Spring Hangers: Spring hangers shall be combination coil-spring and elastomeric insert hanger with spring and insert in compression. Frame shall be steel and shall be fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger rod misalignment without binding or reducing isolation efficiency. Outside spring diameter shall be not less than 80 percent of the compressed height of the spring at rated load. Hanger shall be capable of supporting 200 percent of the rated load, fully compressed, without deformation or failure and shall be equipped with self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

G. Steel Equipment Base: Equipment Base isolators shall be constructed of factory fabricated welded structural steel. Bases shall have shape to accommodate supported equipment. Support brackets shall be factory welded steel

brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support. Bases shall use steel shapes, plates, and bars complying with ASTM A 32/A 36M.

230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 VALVE IDENTIFICATION

A. Provide valve tag on every valve, cock and control devices in each piping system. Exclude check valves, valves within factory fabricated equipment units, HVAC terminal devices and similar rough-in connections of end-use fixtures and units.

B. List each tagged valve in valve schedule for each piping system. And provide valve schedule to owner in operations and maintenance manuals.

1.2 MECHANICAL EQUIPMENT IDENTIFICATION

A. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

1. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
2. Meters, gauges, thermometers and similar units.
3. Fuel burning units including boilers, furnaces, heaters, stills and absorbtion units.
4. Pumps, compressors, chillers, condensers and similar motor driven units.
5. Heat exchangers, coils, evaporators, cooling towers, heat recovery units and similar equipment.
6. Fans, blowers, primary balancing dampers mixing boxes and air terminal units.
7. Packaged HVAC units.
8. Duct heaters and terminal heating and cooling units.
9. Tanks and pressure vessels.
10. Strainers, filters, humidifiers, water treatment systems and similar equipment.

B. Where lettering larger than 1” height is needed for proper identification because of distance from normal location of required identification, stenciled signs may be provided in lieu of engraved sign at contractor’s option.

C. Lettering shall be minimum 1/4” high where viewing distance is less than 2’-0”; 1/2” high for distances up to 6’-0” and proportionately larger for greater distances. Secondary lettering shall be 2/3 to 3/4 of size of the principal lettering.

1.3 PIPING IDENTIFICATION

A. Install pipe markers on each piping system and include arrows to show normal direction of flow.

B. Install pipe markers where piping is exposed to view, concealed by only a removable ceiling system, installed in machine rooms, installed in accessible maintenance spaces and exterior non-concealed locations.

1. Within 5 feet of each valve and control device.
2. Within 5 feet of each branch, excluding take-offs less than 25 feet in length for fixtures or terminal heating and cooling units; mark flow direction of each pipe at branch connection.
3. Within 5 feet where pipes pass through walls, floors or ceilings or enter non-accessible enclosures. Provide identification on each side of wall, floor or ceiling.
4. At access doors, manholes and similar access points which permit view of concealed piping.
5. Within 5 feet of major equipment items and other points of origination and termination.
6. Spaced intermediately at maximum spacing or 50’ along each piping run. Spacing shall be reduced to 25’ in congested areas of piping and equipment where there are more than two piping systems or pieces of equipment.

PART 2 – PRODUCTS

2.1 ENGRAVED LAMINATE SIGN

A. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thickness indicated, engraved with the engravers standard letter style of the sizes and wording indicated. Signs shall be black with white core except as otherwise noted and shall be punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

B. Thickness shall be 1/16” for units up to 20 square inches or 8” in length and 1/8” for larger units.

C. Signs shall be fastened with self-tapping stainless steel screws, except contact type permanent adhesive where screws cannot or should not penetrate the substrate.

2.2 PLASTIC VALVE TAGS

A. Provide manufacturer’s standard solid plastic valve tags with printed enamel lettering with system abbreviation in approximately 3/16” high letters and sequenced valve numbers approximately 3/8” high and with 5/32” hole for fastener

B. Tags shall be 1-1/8” square white tags with black lettering.

2.3 PAINTED IDENTIFICATION

A. Painting where allowed shall be performed using standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications. Minimum letter height shall be 1.25” high for ductwork and equipment and 0.75” high for access door signs and similar operational instructions.

B. Paint shall be exterior type, oil based, black paint.

2.4 PLASTIC TAPE PIPE MARKERS

A. Provide manufacturer’s standard color-coded pressure sensitive vinyl tame not less than 3 mils thick.

B. Tape width shall be 1.5” for pipes less than 6” in diameter and 2.5” wide for larger pipes.

C. Colors shall comply with ANSI A13.1 except where noted otherwise.

D. Lettering shall be manufacturer’s standard pre-printed nomenclature which best describes piping system in each instance, as selected by A/E in cases of variance with names shown or specified. Abbreviate system names only as necessary for each application length.

E. Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering or as a separate unit of plastic.

230593 – TESTING AND BALANCING

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 QUALITY ASSURANCE

A. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

B. The independent testing, adjusting, and balancing agency shall be certified by National Environmental Balancing Bureau (NEBB) or the Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project. The project shall be staffed at all times by qualified personnel.

C. Balance all air system individual terminal devices and branch lines to +/- 10 percent and main ducts and air handling equipment to +/- 5 percent of specified airflow.

D. Balance water systems to +/- 5 percent of specified airflow.

1.2 PROJECT CONDITIONS

A. Systems shall be fully operational prior to beginning procedures.

1.3 SEQUENCE AND SCHEDULING

A. Test, adjust and balance the air systems before hydronic, steam and refrigerant systems.

1.4 PRELIMINARY PROCEDURES

A. In the event that the test and balance contractor is independently contracted with the owner, the division 23 contractor shall assist the test and balance contractor in performing all of these procedures. No extras shall be paid for additional labor or materials required to perform these procedures. Test and balance contractor shall in all cases ensure that these procedures are met to a satisfactory level to perform his work.

B. Before operating the air system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
2. Obtain copies of approved shop drawings of air handling equipment, supply, return and exhaust outlets, and temperature control diagrams.
3. Compare design to installed equipment and field installations.
4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
5. Check filters for cleanliness.
6. Check volume and fire dampers for correct and locked position and temperature control system for complete installation before starting fans.
7. Verify volume dampers are installed at locations needed for balancing the air systems.
8. Prepare test report sheets for both fans and outlets. Obtain manufacturer’s outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
9. Determine best locations in main and branch ductwork for most accurate duct traverses.
10. Place outlet dampers in the full open position.
11. Lubricate all motors and bearings.
12. Check fan belt tension

13. Check fan rotation.

C. Before operating the hydronic system, perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices and balancing valves and fittings are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
3. Remove and clean all strainers
4. Examine hydronic systems and determine if water has been treated and cleaned.
5. Check pump rotation
6. Clean and set automatic fill valves for required system pressure.
7. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
8. Check air vents at high points of systems and determine if all are installed and operating freely or to bleed air completely.
9. Set temperature controls so all coils are calling for full flow.
10. Check operation of automatic bypass valves.
11. Check and set operating temperatures of chillers to design requirements.
12. Lubricate all motors and bearings.

1.5 PERFORMING TESTING AND BALANCING

A. Perform testing and balancing procedures on each system identified in accordance with the detailed procedures outlined in the referenced standard.

B. Cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary to allow adequate adjustment performance of procedures.

C. Patch insulation, ductwork and housings using materials identical to those being removed.

D. Seal ducts and piping and test for and repair leaks.

E. Seal insulation to re-establish integrity of the vapor barrier.

F. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers and similar controls and devices to show final settings. Mark with paint or other suitable, permanent identification materials.

G. Energize motors, verify proper operation of motor, drive system and wheel/impeller. Adjust to indicated RPM. Replace motor pulley or impeller as required to achieve design conditions.

H. Test and adjust mechanical systems for sound and vibration in accordance with the detailed instructions of the referenced standards.

1.6 REPORTS

A. Reports shall be submitted on standard AABC or NEBB forms.

B. Reports shall include Initial, Design and Final readings of the following parameters:

1. Fan Airflow
2. Diffuser and Grille Airflow
3. Outside Airflow
4. External Static Pressure (Supply, Return and Exhaust)

5. Total Static Pressure
6. Motor Amps (Each Phase)
7. Motor Volts (Each Phase)
8. Fan Speed Setting
9. Motor Sheave Diameter/Bore
10. Sheave Centerline Distance
11. Belt Quantity, Make and Size
12. Fan Sheave Make
13. Fan Sheave Diameter/Bore
14. Fan RPM
15. Motor HP
16. Motor RPM
17. Discharge Air Temperature from each piece of Mechanical Equipment.
18. Discharge Air Relative Humidity from each piece of Mechanical Equipment.
19. Outside Air Temperature at Time of Test
20. Outside Air Humidity at Time of Test
21. Sample Space Temperature at Time of Test (minimum 15% of Zones)
22. Sample Space Humidity at Time of Test (minimum 15% of Zones)
23. Pump RPM
24. Pump Flow Rates
25. Equipment Water Flow Rates
26. Pump Inlet and outlet Pressures
27. Total Pump Head
28. Water temperatures in all piping systems.

230700 – HVAC INSULATION

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Schedule insulation application after pressure testing systems and where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Install insulation materials accessories and finishes with smooth straight and even surfaces, free of voids throughout the length of equipment, ducts and fittings and piping including fittings valves and specialties.

C. Install insulation materials, forms, vapor barriers or retarders, jackets and thicknesses required for each item of equipment, duct system and pipe system specified in insulation system schedules.

D. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode soften or otherwise attack insulation or jacket in either wet or dry state.

E. Install insulation with longitudinal seams at top and bottom of horizontal runs.

F. Install multiple layers of insulation with longitudinal seams staggered.

G. Do not weld brackets, clips or other attachment devices to piping, fittings and specialties.

H. Keep insulation materials dry during application and finishing.

I. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

J. Install insulation with least number of joints practical.

K. Where vapor barrier is indicated, seal joints, seams and penetrations in insulation at hangers, supports, anchors and other projections with vapor-barrier mastic.

L. Install insulation continuously through hangers and around anchor attachments.

M. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor barrier mastic.

N. For insulation with factory applied jackets cover circumferential joints with 3” wide strips of same material insulation jacket. Secure strips per manufacturer’s recommendations. Overlap jacket longitudinal seams at least 1.5”. Install longitudinal seams at bottom of ductwork.

O. Cut insulation in manner to avoid compressing insulation more than 75 percent of it’s nominal thickness.

P. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

Q. Install insulation continuously through roof penetrations.

R. For wall penetrations, seal penetrations with flashing sealant.

S. Install insulation continuously through penetrations of fire rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2”.

T. For all fire rated duct, insulate access panels and doors to achieve same fire rating as duct.

1.2 DUCT INSULATION APPLICATION SCHEDULE

A.	Rectangular Supply Return and Exhaust Ductwork (<2000 FPM):	FDW	1.5” Thickness
B.	Rectangular Supply Return and Exhaust Ductwork (>2000 FPM):	FDW	1.5” Thickness
C.	Rectangular Exposed Ductwork (<2000 FPM)	LVL	0.5” Thickness
D.	Rectangular Exposed Ductwork (>2000 FPM)	HVL	0.5” Thickness

E.	Rectangular Transfer Air Ductwork	LVL	0.5” Thickness
F.	Round Supply Return and Exhaust Ductwork:	FDW	1.5” Thickness
G.	Round Exposed Supply	Double Wall Spiral. See Duct Specification	
H.	Round Exposed Return and Exhaust	Single Wall Spiral. Uninsulated.	
I.	Return Air Boot Ductwork	LVL	0.5” Thickness
J.	Outdoor Air Ductwork:	EDW	1.5” Thickness
K.	Exterior Ductwork:	NFCC	--
L.	Ductwork in Unconditioned Space:	FDW	3” Thickness
M.	Kitchen Hood Ductwork (two layers):	FRB/FRB	1.5”/1.5” Thickness

PART 2 – PRODUCTS

2.1 EXTERNAL DUCT INSULATION

A. Foil Faced Duct Wrap (FDW): Insulation shall comply with ASTM C 1290 and ASTM C 553 and shall have 1.0 pound per cubic foot density with thermal conductivity of 0.26 Btuh maximum when rated at 75 degrees Fahrenheit mean temperature. Insulation shall be equipped with Foil facing compliant with ASTM C1136 with a maximum vapor transmission rate of 0.02 perms. Provide joint sealants and tapes according to manufacturer’s recommendations.

B. Elastomeric Duct Wrap (EDW): Insulation shall comply with ASTM C 534 and shall have 1.0 pound per cubic foot density with thermal conductivity of 0.27 Btuh maximum when rated at 75 degrees Fahrenheit mean temperature. Insulation shall be closed cell, elastomeric type with white thermoplastic rubber membrane. Joints shall be sealed with tape rated for exposure to weather elements according to manufacturer’s requirements. Provide joint sealants according to manufacturer’s recommendations. Where installed in outdoor location, and after adhesive has fully cured, apply two coats of insulation manufacturer’s recommended UV protective coating. Coating shall be rated for location of installation.

2.2 INTERNAL DUCT INSULATION

A. Low Velocity Duct Liner (LVL): Insulation shall comply with ASTM C 1071 and shall have 2.0 pound per cubic foot density with maximum thermal conductivity of 0.24 Btuh when rated at 75 degrees mean temperature. Facing shall have maximum water vapor sorption rate of 4% by weight.

B. High Velocity Duct Liner (HDL): Insulation shall comply with ASTM C 1071 and shall have 2.0 pound per cubic foot density with maximum thermal conductivity of 0.24 Btuh when rated at 75 degrees mean temperature. Facing shall have maximum water vapor sorption rate of 2% by weight.

2.3 FIRE RATED INSULATION

A. Fire Rated Blanket (FRB): Provide high temperature, flexible blanket insulation with FSK jacket that is tested and certified to provide a fire rating acceptable to authority having jurisdiction. Blanket shall be rated for use with zero clearance from combustible materials.

2.4 INTEGRAL INSULATION

A. Non-Fibrous Closed Cell Outdoor Ductwork (NFCC): Minimum insulation value of R12. See Ductwork specification section for more information.

2.5 ADHESIVES

A. Duct Liner Adhesive (LVL and HDL): Solvent Based Liner Adhesive. Comply with ASTM C 916. Adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR, Subpart D (EPA Method 24).

B. Duct Wrap Adhesive (FDW and EDW): Solvent based resin adhesive with a service temperature range of -75 degrees F to +300 degrees F. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

230701 – HVAC PIPING INSULATION

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL

A. Provide necessary materials and accessories for installation of insulation for plumbing and mechanical systems as specified and/or detailed on drawings. Insulation type, jacket, and thickness for specific piping systems or equipment shall be as listed in this specification section.

B. Products or their shipping cartons shall bear label indicating their flame and smoke ratings. Treatments of jackets or facings for impart flame and smoke safety shall be permanent. Use of water soluble treatments such as corn paste or wheat paste is prohibited. This does not exclude approved lagging adhesives.

C. Install insulation over clean dry surfaces with joints firmly butted together. Insulation at equipment, flanges, fittings, etc. shall have straight edges with box type joints with corner beads as required. Where plumbing and heating insulation terminates at equipment or unions, taper insulation at 30 degree angle to pipe with one coat finishing cement and finish same as fittings. Total insulation system shall have neat smooth appearance with no wrinkles, or folds in jackets, joint strips, or fitting covers. Seal butt joints at maximum intervals of 45 feet to prevent vapor barrier failures from being transmitted to adjoining insulations sections.

D. Undamaged insulation systems on cold surface piping and equipment shall perform their intended functions as vapor barriers and thermal insulation without premature deterioration or vapor barrier. Contractor shall take every reasonable precaution to provide insulation systems with continuous unbroken vapor barriers.

E. Products shall not contain asbestos, lead, mercury or mercury compounds.

1.2 QUALITY ASSURANCE

A. Flame/Smoke Ratings: Provide composite Plumbing insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.

1. Exception: Outdoor Piping insulation may have flame spread index of 75 and smoke developed index of 150.

B. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

C. Insulation installer shall advise contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

1.3 INSULATION INSTALLATION REQUIREMENTS

A. Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps.

C. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.

D. Maintain integrity of vapor-barrier jackets on cold pipe insulation, and protect insulation with shields to prevent puncture or other damage. Provide high density insulation of material as specified herein and of length equivalent to pipe shield. Provide pipe hangers sized for the pipe outside diameter plus insulation thickness. Seal butt joint between insulation and high density insulation with wet coat of vapor barrier lap cement.

1. Exception for vertical piping: Provide clamps sized for the outside diameter of the vertical pipe and extend clamp through insulation. Seal penetrations of insulation and vapor barrier with wet coat of vapor barrier lap cement.

E. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

F. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

G. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with

insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

H. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

I. Exterior Piping Protection:

1. Piping less than 1.5” nominal outside diameter: All exterior piping insulation shall be painted with ultraviolet-resistant paint. Color as selected by architect.

2. Piping 1.5” nominal outside diameter and greater: Provide an aluminum jacket over all exterior piping insulation. UV paint is not required.

1.4 EQUIPMENT INSULATION REQUIREMENTS

A. Install equipment thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.

B. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.

C. Maintain integrity of vapor-barrier on equipment insulation and protect it to prevent puncture and other damage.

D. Do not apply insulation to equipment, breechings, or stacks while hot.

E. Apply insulation using the staggered joint method for both single and double layer construction, where feasible. Apply each layer of insulation separately.

F. Coat insulated surfaces with layer of insulating cement, troweled in workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chipped edges and depressions, and cover over wire netting and joints with cement of sufficient thickness to remove surface irregularities.

G. Cover insulated surfaces with all-service jacketing neatly fitted and firmly secured. Lap seams at least 2". Apply over vapor barrier where applicable.

H. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.

I. Provide removable insulation sections to cover parts of equipment which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.

J. Equipment Exposed to Weather: Protect outdoor insulation from weather by installation of weather-barrier mastic protective finish, or jacketing, as recommended by the manufacturer.

1.5 INSULATION APPLICATION SCHEDULE:

A.	Chilled Water Piping (Up to 1.25”)	Elastomeric	0.5” Thickness
B.	Chilled Water Piping (Above 1.25”)	Elastomeric	1” Thickness
C.	Hot Water Piping (Up to 1.25”)	Elastomeric	0.5” Thickness
D.	Hot Water Piping (Above 1.25”)	Elastomeric	1” Thickness
E.	Chilled/Hot Water Piping (Up to 1.25”)	Elastomeric	0.5” Thickness
F.	Chilled/Hot Water Piping (Above 1.25”)	Elastomeric	1” Thickness
G.	Refrigerant Piping Suction and Return (Up to 1”)	Elastomeric	0.5” Thickness
H.	Refrigerant Piping Suction and Return (Above 1”)	Elastomeric	0.75” Thickness
I.	Variable Refrigerant Split System Piping	Elastomeric	0.5” Thickness
J.	Condensate Drain Piping	Elastomeric	0.5” Thickness

K.	Cold Surface Equipment	Elastomeric	1” Thickness
L.	Hot Surface Equipment	Elastomeric	1” Thickness

PART 2 - PRODUCTS

2.1 ELASTOMERIC INSULATION:

A. Flexible Elastomeric insulation shall be closed-cell, sponge or expanded-rubber materials and comply with ASTM C 534, type I for tubular materials and type II for sheet products. Insulation values shall comply with energy code minimum requirements. See common work results for current code edition.

2.2 FIBERGLASS INSULATION:

A. Fiberglass insulation shall be mineral-fiber blanket insulation with mineral or fiber glass fibers bonded with a thermosetting resin and comply with ASTM C 553, type V, without factory applied jacket. Insulation values shall comply with energy code minimum requirements. See common work results for current code edition.

2.3 ADHESIVES AND TAPES:

A. Insulating cements and adhesives shall be compatible with the insulation materials, jackets and substrates for bonding insulation to itself and to surfaces to be insulated.

B. Mastics shall be compatible with insulation materials, jackets, and substrates and shall comply with MIL-C-19565C Type II. Vapor-barrier mastic shall be water based suitable for indoor and outdoor use on below ambient services.

C. Tapes shall be white, vapor-retarder tape matching factory-applied jacket with acrylic adhesive and shall comply with ASTM C 1136.

D. All insulation finishes shall be compatible with the insulation product being finished and shall be in a color as selected by architect.

230901 – STAND ALONE CONTROL DEVICES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Control devices shall be installed plumb and level.

B. Mechanical contractor shall provide all wiring required for installation of thermostats. Conduits and backboxes shall be provided by electrical contractor. It is responsibility of mechanical contractor to coordinate required conduit paths with E/C.

C. Contractor coordinate desired occupancy schedule with owner and shall program thermostat as desired.

D. Contractor shall provide training for owner on programming and use of thermostat.

PART 2 – PRODUCTS

2.1 WEB CONNECTED PROGRAMMABLE THERMOSTAT

A. Thermostat shall be able to connection wirelessly to local wifi network.

B. Thermostat shall be 7-day programmable type

C. Thermostat shall be suitable for staging of equipment shown on plans.

D. Provide dual fuel capable thermostat for heat pump systems with gas or electric auxiliary heating source.

E. Thermostat shall be compatible with a humidifier, dehumidifier, ventilator, HRV or ERV.

F. Thermostat shall be able to sense temperature, motion, proximity and humidity.

G. Thermostat shall be equipped with touch screen, backlit, LCD display.

H. Thermostat shall be equipped with access limiting functions to prevent tampering

I. Thermostat shall be provided standard with a single averaging sensor and installed where shown on plans. Thermostat shall have the ability to add additional averaging sensors where shown on plans.

J. Thermostat shall not require a paid fee to operate in full function.

K. Where the thermostat requires a gateway to access the internet the contractor shall be responsible for providing this and it shall be included as a complete system.

2.2 REMOTE AVERAGING SENSOR

A. Sensor shall be suitable for indoor use.

B. Sensor shall be wired unless otherwise noted on plans.

C. Operating range shall be suitable for use.

2.3 TAMPER RESISTANT THERMOSTAT GUARD

A. Thermostat guard shall be constructed with plastic except in high impact areas, and equipped with a solid wall mounting plate.

B. Cover shall be lockable.

C. In high impact areas thermostat guard shall be constructed with steel. Color shall match wall color. Provide high impact thermostat guards where noted on plans.

230903 – VARIABLE REFRIGERANT SPLIT SYSTEM CONTROLS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Control devices shall be installed plumb and level.

B. Mechanical contractor shall provide all wiring required for installation of thermostats. Conduits and backboxes shall be provided by electrical contractor. It is responsibility of mechanical contractor to coordinate required conduit paths with E/C.

C. Contractor coordinate desired occupancy schedule with owner and shall program thermostat as desired.

D. Contractor shall provide training for owner on programming and use of thermostat.

PART 2 – PRODUCTS

2.1 ZONE THERMOSTAT

A. Thermostat shall be equipped with LCD touch screen for adjustment and display of all setpoints.

B. Thermostat shown on plan shall allow adjustment of zone temperature and humidity setpoints and adjustment of system operation, and fan operation mode. Thermostat shall display zone temperature, humidity, system operation mode (HEAT/COOL/AUTO), and fan operation mode (ON/AUTO). Thermostat shall display additional points and allow additional setpoint adjustments as noted on plans.

C. Thermostat shall be 7-day, 24 hour programmable and shall be capable of programming from thermostat touch screen.

D. Thermostat shall be capable of lockout to prevent limited or restricted adjustment of system setpoints and operation modes.

2.2 CENTRAL CONTROLLER

A. Central controller shall provide web connected interface for remote adjustment and display of all equipment inputs and outputs specified on control diagrams on plans.

B. Controller shall be compatible with BACnet protocol for complete integration with other control systems utilizing the same protocol.

C. Controller shall be equipped with network card, and server software to allow access of all data points over customer provided local area network.

D. Controller shall be equipped with LCD screen for local adjustment and display of system data points. Contractor shall have option of providing alternate means of adjustment, such as locally connected handheld device, where approved by A/E.

E. Controller shall be capable of adjustment of occupancy mode and schedule for each thermostat individually or by grouping as set by end user.

232113 – HVAC PIPING AND SPECIALTIES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 PIPING INSTALLATIONS

A. Provide piping material for use as listed in piping materials schedule shown on plans.

B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve services

F. Install piping free from sags and bends

G. Install fittings for changes in direction and branch connections.

H. Install piping to allow application of insulation.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install groups of pipes parallel to each other spaced to permit application of insulation and servicing of valves.

K. Install drains, consisting of a tee fitting, NPS 0.75” ball valve and short NPS 0.75” threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

L. Install piping at uniform grade of 0.2 percent upward in direction of flow.

M. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

N. Install branch connections to mains using mechanically formed tee fittings in main pipe with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

O. Install unions in piping 2” and smaller, adjacent to valves, at final connections of equipment and at other locations noted on plans.

P. Install flanges in piping 2.5” and larger at final connections of equipment and elsewhere as indicated

Q. Install strainers on inlet side of each control valve, pressure reducing valve, solenoid valve, in-line pump and at other locations noted on plans. Install 0.75” nipple and ball valve in blowdown connection of strainers 2” and larger. Match size of strainer blowoff connection for strainers smaller than 2”.

R. Identify piping as specified in Division 23 Section “Identification for HVAC Piping and Equipment”.

1.2 HANGERS AND SUPPORTS

A. Copper and Steel Pipe hangers shall be installed with the following maximum spacing and minimum rod sizes.

1. 0.75” Pipe - Max Span 5’ - Minimum Rod Size 3/8”
2. 1” Pipe - Max Span 6’ - Minimum Rod Size 3/8”
3. 1.25” Pipe - Max Span 7’ - Minimum Rod Size 3/8”
4. 1.5” Pipe - Max Span 8’ - Minimum Rod Size 3/8”
5. 2” Pipe - Max Span 8’ - Minimum Rod Size 3/8”
6. 2.5” Pipe - Max Span 9’ - Minimum Rod Size 1/2”
7. 3” Pipe - Max Span 10’ - Minimum Rod Size 1/2”
8. 4” Pipe - Max Span 14’ - Minimum Rod Size 5/8”
9. 5” Pipe - Max Span 16’ - Minimum Rod Size 5/8”

10. 6” Pipe - Max Span 17’ - Minimum Rod Size 3/4”
11. 8” Pipe - Max Span 19’ - Minimum Rod Size 3/4"
12. 10” Pipe - Max Span 22’ - Minimum Rod Size 7/8”
13. 12” Pipe - Max Span 23’ - Minimum Rod Size 7/8”
14. 14” and larger Pipe – Max Span 25’ – Minimum Rod Size 1”

B. Plastic piping hangers shall be spaced according to pipe manufacturer’s written instructions for service conditions. Avoid point loading and space and install hangers with the fewest practical rigid anchor points.

C. Support vertical piping runs at roof, each floor and at 10 foot intervals between floors.

1.3 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt and debris from inside and outside of pipe and fittings before assembly.

C. Soldered joints: Apply ASTM B813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B 828 or CDA’s “Copper Tube Handbook.” Using lead free solder allow complying with ASTM B 32.

D. Brazed Joints: Construct joints according to AWS’s “Brazing Handbook”, “Pipe and Tube” Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full interior diameter. Join pipe fittings as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Do not used pipe of pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

F. Welded Joints: Construct joints according to ASW D10.12/D10.12M, using qualified processes and welding operators according to specified quality assurance requirements.

G. Flanged Joints: Select appropriate gasket material, size, type and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

H. Plastic Piping Solvent Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following.

1. Comply with ASTM F402 for safe handling practice of cleaners, primers and solvent cements.
2. CPVC piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Pressure Piping: Join schedule 40, 80 and 120 according to ASTM D 2672. Join other-than-schedule number 40, 80 and 120 PVC pipe and socket fittings according to ASTM D 2855.
4. 4.PVC Non-pressure Piping: Join according to ASTM D 2855.

I. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions

1.4 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

D. Install ports for pressure gauges and thermometers at coil inlet as outlet connections.

1.5 PIPE EXPANSION

A. Provide expansion joints, expansion loops, anchors and guides as required for proper control of expansion and contraction of piping. Piping from mains to equipment branches and risers shall be provided with swing, swivel joints or offsets to relieve stresses due to expansion or contraction of piping.

B. Provide pipe loops as shown on drawings or specified. Where pipe loop dimensions are not shown on plans they shall be as recommended by pipe manufacturer based on thermal expansion.

C. Expansion Joints Specified below shall comply with the following:

1. Install expansion joints of sizes matching sizes of piping in which they are installed
2. Install packed type expansion joints with packing suitable for fluid service
3. Install metal bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturer's Association, Inc."
4. Install rubber packless joints according to FSA-NMEJ-702.
5. Install grooved joint expansion joints to grooved-end steel piping.

D. Expansion loops shall comply with the following:

1. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

E. Alignment guide anchors specified below shall comply with the following:

1. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.
2. Install two guides on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.
3. Install anchors at locations required to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of location and stresses to connected equipment.

1.6 REFRIGERANT SPECIFIC SYSTEM INSTALLATION REQUIREMENTS

A. Charge the system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 PSI.
4. Charge system with a new filter dryer core in charging line.

B. Refrigerant system Adjustment:

1. Adjust the thermostatic expansion valve to obtain proper evaporator superheat.
2. Adjust high and low pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
3. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions.
    a. Open shutoff valves in condenser water circuit.
    b. Verify that compressor oil level is correct.
    c. Open compressor suction and discharge valves.
    d. Open refrigerant valves except bypass valves that are used for other purposes.
    e. Check open compressor-motor alignment and verify lubrication for motors and bearings.

4. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

1.7 FIELD QUALITY CONTROL

A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.

2. Provide temporary restraints for expansion joints than cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.

3. Flush hydronic piping systems with clean water, then remove and clean or replace strainer screens.

4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.

5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on all piping:

1. Hydrostatic Test:

a. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.

b. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.

c. Isolate expansion tanks and determine that hydronic system is full of water.

d. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

e. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.

2. Procedures required by authority having jurisdiction that exceed requirements of tests listed above shall be performed by contractor to obtain system acceptance.

C. Perform the following before operating the system:

1. Open manual valves fully.

2. Inspect pumps for proper rotation.

3. Set makeup pressure-reducing valves for required system pressure.

4. Inspect air vents at high points of system and determine if all are installed and bleed air completely.

5. Set temperature controls so all coils are calling for full flow.

6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.

7. Verify lubrication of motors and bearings.

D. After testing:

1. Adjust set point temperature of all HVAC equipment to system design temperatures. Temperatures shall be as listed on drawings or as directed by owner.

PART 2 – PRODUCTS

2.1 PIPING

A. Copper Tube:

1. Provide hard temper copper water tubing conforming to ASTM B 88. Tubing shall be type K, L or M as listed in schedule.

2. Tubing joints shall be soldered or brazed as indicated in schedule.

B. DWV Copper Tube:

1. Type M DWV copper tubing shall conform to ASTM B 306, type DWV.

C. ACR Copper Tubing:

1. Provide hard temper nitrogenized seamless copper refrigerant tubing conforming to ASTM B 88. Tube shall be L or K as listed in schedule.

2. Tubing shall be brazed or grooved joints manufactured to copper tube dimensions. Flaring tubing ends to accommodate alternate sized couplings is not allowed.

3. Type ACR soft copper tubing conforming to ASTM B 280 shall be allowed for connection between VRF air handlers nominal size 0 to 5 tons, and branch selector/controller boxes, as allowed by air handler manufacturer.

D. Steel Pipe:

1. Steel pipe shall conform to ASTM A53 and shall be black steel with plain ends. Type, grade and wall thickness shall be as indicated in piping materials schedule.

E. Plastic Pipe:

1. PVC Plastic pipe shall conform to ASTM D 1785. Piping shall be schedule 40 or schedule 80 as listed in schedule.

2. CPVC Plastic pipe shall conform to ASTM F 438 for schedule 40 pipe and ASTM F 439 schedule 80 pipe.

F. Polyethylene (PE) Pipe:

1. Conform to ASTM D 2239, with SIDR numbers 5.3, 7, 9 or 11.5 with PE compound number required to achieve required system working pressure.

2. U-Bend Assembly shall be factory fabricated with embossed depth stamp every 36” from U-Bend.

2.2 FITTINGS

A. Wrought Copper Fittings:

1. Provide wrought solder joint copper tube fitting conforming to ANSI B 16.22

B. Cast Iron Threaded Fittings:

1. Conform to ASME B 16.4 with classes as indicated on piping material schedule.

C. Nickel Copper Alloy Steel Welding Fittings:

1. Provide nickel copper alloy steel welding fittings conforming to ANSI B16.9 and ASTM A234.

D. Steel piping fittings:

1. Wrought Steel Fittings:

a. Provide carbon steel fittings conforming to ASTM A 234/A 2345M with wall thickness to match adjoining pipe.

2. Wrought Cast and Forged Steel Flanges:

a. Fittings shall conform to ASME B 16.5 including bolts nuts and gaskets of material group 1.1. End connections shall be butt welded and facings shall be raised face type.

E. Cast Bronze Fittings:

1. Cast bronze fittings shall be solder joint type conforming to ANSI B 16.18.

F. Plastic piping Fittings:

1. PVC Plastic Pipe

a. Socket type fittings conforming to ASTM D 2466 for schedule 40 and ASTM D 2467 for schedule 80.

2. CPVC Plastic Pipe

a. Socket type fittings conforming to ASTM F 438 for Schedule 40 and ASTM F 439 for Schedule 80.

G. Polyethylene (PE) fittings:

1. Molded PE fittings conforming to ASTM D 2683 or ASTM D 3261 made with PE resin and socket or butt fusion type made to match PE pipe dimensions and class.

2.3 JOINING MATERIALS

A. Pipe flange gasket materials shall be suitable for chemical and thermal conditions of piing system contents. Provide 1/8” maximum thickness, nonmetallic, flat, asbestos free material conforming to ASME B 16.21.

B. Flange bolts and nuts shall conform to ASME B18.2.1 and shall be carbon steel unless otherwise noted.

C. Plastic pipe flange gasket bolts and nuts shall be type and material recommended by piping system manufacturer.

D. Solder filler metals shall conform to ASTM B 32 and shall be lead free alloys that include water flushable flux according to ASTM B 813.

E. Brazing filler metals shall conform to AWS A 5.8 BCuP series and shall be copper phosphorus alloys for joining copper with copper or Bag-1 silver alloy for joining copper with bronze or steel.

F. Welding filler materials shall comply with ASW D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements for Joining Plastic Pipe:

1. CPVC piping cements shall conform to ASTM F 493.

2. PVC piping solvent cements shall conform to ASTM D 2564. Include primer complying with ASTM F 656.

H. Gasket material thickness, material and type shall be suitable for fluid to be handled and working temperatures and pressures.

2.4 TRANSITION FITTINGS

A. Plastic to Metal Transition Fittings:

1. Provide one piece fitting with one threaded brass or copper insert and one Schedule 80 solvent-cement-joint end.

B. Plastic to Metal Transition Unions:

1. Provide MSS SP-107 union. Include brass or copper end, schedule 80 solvent cement joint end, rubber gasket and threaded union.

2.5 DIELECTRIC FITTINGS

A. Fittings shall be combination fitting of copper alloy and ferrous materials with threaded solder joint plain or weld neck end connections that match piping system materials.

B. Insulating material shall be suitable for system fluid, pressure and temperature

C. Dielectric unions:

1. Provide factory fabricated union assembly with pressure and temperature rating suitable for system operating range.

D. Dielectric Flanges:

1. Provide factory fabricated companion flange assembly with pressure and temperature rating suitable for system operating range.

E. Dielectric Coupling:

1. Provide galvanized steel coupling with inert and non-corrosive thermoplastic lining and threaded ends. Coupling shall have pressure and temperature rating suitable for system operating range.

F. Dielectric Nipples:

1. Provide electroplated steel nipple with inert and noncorrosive, thermoplastic lining, plain, threaded or grooved ends. Nipples shall have pressure and temperature rating suitable for system operating range.

2.6 AIR CONTROL DEVICES

A. Air Vents: Manual air vents shall be equipped with bronze body, non-ferrous material for all internal parts, thumbscrew operator, 0.5” inlet connection, 1/8” discharge connection, 150 PSI CWP rating and 225 degree F maximum operating temperature.

B. Air Separator: Tangential type air separator shall be welded steel ASME constructed tank labeled for 125 PSI minimum working pressure and 375 degree F maximum operating temperature. Air collector tube shall be stainless steel constructed to release air into expansion tank.

C. Air Purger: Air purgers shall have one-piece cast iron tank with an integral weir constructed to decelerate system flow to maximize air separation. Maximum working pressure shall be up to 175 PSI and maximum operating temperature shall be up to 300 degrees.

D. Vacuum Breakers: Vacuum breakers shall have cast iron body, threaded end connections, stainless steel sealing ball, EPR O-Ring and pressure and temperature rating suitable for system operating range.

2.7 EXPANSION TANK

A. Tank shall be welded steel rated for 125 PSI working pressure and 375 degree F maximum operating temperature. Tank shall be factory tested with taps fabricated and supports installed and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII Division I.

B. Diaphragm shall be securely sealed into tank to separate air charge from system water to maintain required expansion capacity.

C. Tank shall be equipped with Schrader valve, stainless steel air charge fitting with EPDM seats.

2.8 PACKLESS EXPANSION JOINTS

A. Metal Compensator: Expansion joints shall have 2-ply phosphor bronze bellows, brass shrouds and end fittings for copper piping systems and 2-ply stainless steel bellows, carbon steel shrouds and end fittings for steel piping systems. Expansion compensators shall have internal guides, anti-torque device and removable end clip for proper positioning.

2.9 EXPANSION LOOPS

A. Provide pipe expansion loop constructed of main pipe material. Acceptable methods include use of elbows in a U or Z shape as defined by ASHRAE or ASME; or a detailed stress analysis may be utilized to define areas of expansion.

2.10 ALIGNMENT GUIDES AND ANCHORS

A. Provide steel, factory fabricated alignment guide with bolted two-section outer cylinder and base for attaching to structure; with two section guiding spider for bolting to pipe.

B. Anchors shall be mechanically fastened with tension and shear capacities appropriate for application.

233113 – HVAC DUCTWORK

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Install ducts according to SMACNA's "HVAC Duct Construction Standards – Metal and Flexible" unless otherwise indicated.

B. Protect all ducts and fittings from exposure to moisture prior to installation.

C. Exposed round ductwork shall be double wall spiral.

D. Install round or flat oval ducts in maximum practical lengths.

E. Install ducts with fewest possible joints.

F. Flat oval ducts: Indicated dimensions are the duct width and diameter of the round sides connecting the flat portions of the duct.

G. In the event that a conflict is identified between duct size shown on plans, and building structure or finish ceiling, contractor shall modify duct routing and length-width ratio as required to resolve conflict. Contractor shall have option to modify exact duct configuration for this purpose provided the static pressure, and duct velocity matches performance of specified duct. All modifications shall be clearly marked on as built documents.

H. Install shop or factory fabricated fittings for changes in direction, size and shape and for branch connections.

I. Unless otherwise noted, install ducts vertically and horizontally and parallel and perpendicular to building lines.

J. Install ducts close to walls, overhead construction, columns and other structural and permanent enclosure elements of building.

K. Install ducts with a clearance of 1" plus allowance for insulation thickness. Sizes noted on plans indicate free area of duct for airflow. Add additional thickness for insulation as noted in duct insulation schedule.

L. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures, unless specifically noted on plans. Ducts shall not be allowed to pass over electrical panels.

M. Where ducts pass through non-fire-rated partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1.5 inches.

N. Where ducts pass through fire rated interior partitions and exterior walls, install fire dampers.

O. During construction, protect duct interiors from moisture, construction debris and dust and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."

P. Visually inspect duct system to ensure that no visible contaminants are present after installation is complete.

1.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched or damaged.

B. All exposed ducts shall be painted to match adjacent building finishes.

C. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

D. Grind welds to provide smooth surface free of burrs, sharp edges and weld splatter. Remove all discoloration caused by welding.

E. Maintain consistency, symmetry and uniformity in the arrangement and fabrication of fittings hangers and supports, duct accessories and air outlets.

1.3 DUCT SEALING

A. Ducts shall be sealed in accordance with table 1.2 of SMACNA's "HVAC Duct Construction Standards – Metal and Flexible". The allowable air leakage shall be in compliance with SMACNA standards for each respective duct pressure class and duct seal class.

B. All duct pressure classes shall be equal or greater to the external static pressure of the equipment supply the duct. The applicable pressure class shall be maintained throughout entire system.

C. Spiral lock seams in round or flat oval ducts are not required to be sealed.

D. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards – Metal and Flexible"

1. Outdoor Supply Air Ducts: Seal Class A
2. Outdoor Exhaust Air Ducts: Seal Class C
3. Outdoor Return Air Ducts: Seal Class C
4. Unconditioned Space Supply Air Ducts, Pressure Class 2" and Lower: Seal Class B
5. Unconditioned Space Supply Air Ducts, Pressure Class higher than 2": Seal Class A
6. Unconditioned Space Exhaust Ducts: Seal Class C
7. Unconditioned Space Return Air Ducts: Seal Class B
8. Conditioned Space Supply Air Ducts, Pressure Class 2" and lower: Seal Class C
9. Conditioned Space Supply Air Ducts , Pressure class higher than 2": Seal Class B
10. Conditioned Space Exhaust Ducts: Seal Class B
11. Conditioned Space Fresh/Return Air Ducts: Seal Class C

PART 2 – PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

A. Select transverse joints, longitudinal seams, elbows, transitions, offsets, branch connections and other duct constructions and fabricate according to SMACNA's "HVAC Duct Construction Standards – Metal and Flexible" as follows:

1. Minimum duct thickness shall be 26 gauge.
2. Use static pressure class, applicable sealing requirements, materials involved, duct support intervals and all other provisions as specified in SMACNA manual.
3. Transverse joints: Figure 1-4 "Transverse (Girth) Joints"
4. Longitudinal Seams: Figure 1-5 "Longitudinal Seams - Rectangular Ducts"
5. All elbows of 20 degrees or greater shall be equipped with turning vanes. Turning vanes shall be 26 gauge, high efficiency profile, airfoil type mounted at 2.125" on center on 25 gauge runners.
6. Elbows, Transitions, Offsets, Branch Connections and other duct construction: Chapter 2 "Fittings and other construction"

2.2 ROUND AND FLAT OVAL DUCTS AND FITTINGS

A. Select transverse joints, longitudinal seams, tees, laterals and other duct constructions and fabricate according to SMACNA's "HVAC Duct Construction Standards – Metal and Flexible" as follows:

1. Minimum duct thickness shall be 26 gauge.
2. Use static pressure class, applicable sealing requirements, materials involved, duct support intervals and all other provisions as specified in SMACNA manual.
3. Transverse joints:

a. Figure 3-2 “Transverse (Girth) Joints”

b. In ducts larger than 90” in diameter, transverse joints shall be flanged.

4. Longitudinal Seams:

a. Figure 3-1 “Seams – Round duct and Fittings”

b. Fabricate round ducts larger than 90 “ in diameter with butt welded longitudinal seams.

c. Fabricate flat oval ducts larger than 72” in width with butt-welded longitudinal seams.

5. Tees and Laterals: Figure 3-4 “90 degree Tees and Laterals” and Figure 3-5 “Conical Tees”

2.3 DOUBLE WALL SPIRAL

A. Outer Duct: Select transverse joints, longitudinal seams, tees, laterals and other duct constructions and fabricate according to SMACNA’s “HVAC Duct Construction Standards – Metal and Flexible” as follows:

1. Use static pressure class, applicable sealing requirements, materials involved, duct support intervals and all other provisions as specified in SMACNA manual.

2. Transverse joints:

a. Figure 3-2 “Transverse (Girth) Joints”

b. In ducts larger than 90” in diameter, transverse joints shall be flanged.

3. Longitudinal Seams:

a. Figure 3-1 “Seams – Round Duct and Fittings”

b. Fabricate round ducts larger than 90 “ in diameter with butt welded longitudinal seams.

c. Fabricate flat oval ducts larger than 72” in width with butt-welded longitudinal seams.

4. Tees and Laterals: Figure 3-4 “90 degree Tees and Laterals” and Figure 3-5 “Conical Tees”

B. Inner Duct: Perforated galvanized sheet steel duct having overall open area of 23 percent.

C. Interstitial Insulation: Fibrous glass liner complying with ASTM C 1071, NFPA 90A or NFPA 90B and with NAIMA AH124 “Fibrous Glass Duct Liner Standard”

2.4 FLEX DUCT

A. Duct shall comply with NFPA, BOA, NFPA 90B and UL 181, class I Air duct

B. Duct shall be factory insulated with flexible fiberglass insulation with a minimum R-Value of 5.0 at a mean temperature of 75 degrees F.

C. Insulation shall be covered with reinforced aluminum pigmented vapor barrier jacket having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E 96, procedure A.

D. Flexible duct shall be rated for a velocity of at least 4000 feet per minute and shall be suitable for operating temperatures of at least 250 degrees F.

E. Internal working pressure:

1. Low Pressure Duct Class: Minimum of 6” WC positive and 4” WC negative.

2. Medium Pressure Duct Class: Minimum of 10” WC positive and 6” WC negative.

2.5 PREFABRICATED OUTDOOR DUCTWORK

A. Non-Fibrous Closed Cell Duct with integral insulation:

1. Factory Fabricated duct and fittings equipped with exterior and interior lining an internal closed cell fibrous insulation. Duct shall be suitable for outdoor use.

2. Application: All duct installed exterior to the building envelope.

3. Liner: Fortified inner liner compliant to UL-181 tested and passed for the following:

    a. Test for Surface Burning Characteristics
    b. Flame Penetration Test
    c. Burning Test
    d. Mold Growth and Humidity Test
    e. Low Temperature Test and High Temperature Test
    f. Puncture Test
    g. Static Load Test
    h. Impact Test
    i. Pressure Test and Collapse (negative pressure) Test
    j. High Temperature and Humidity for 90 days
    k. Cone Calorimeter
    l. ASTM E2257 Standard Test Method for Room Fire Test of Wall and Ceiling Materials and Assemblies
    m. ASTM E 84 tested, Tunnel Test, Does not exceed 25 flame spread, 50 smoke developed.
    n. DW144, Class B
    o. NRTL product approval, (Subpart S of 29 CFR Part 1910, OSHA)
    p. ASTM C 423 noise reduction
    q. ASTM E 96/E 96M Procedure A for permeability
    r. ASTM C 1071 for erosion
    s. ASTM C 518: 2004, Standard Test Method for Steady–State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
    t. UL 723, Test for Surface Burning Characteristics of Building Materials
    u. NFPA Compliance:
        i. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems"
        ii. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems"
        iii. NFPA 255, “Standard Method of Test of Surface Burning Characteristics of Building Materials

4. Outer shell shall be a UV stable, 39 mil high impact resistant titanium infused vinyl with included testing as following;

    a. UL-94 Flammability V-0
    b. ASTM D-638 Tensile Strength of 6250 psi
    c. ASTM D-790 Flexible Strength of 11,000 psi
    d. ASTM D-4226 Drop Impact Resistance
    e. ASTM D-4216 Cell Classification

5. The panel shall be manufactured of CFC-free closed cell rigid thermoset resin thermally bonded on both sides to a factory applied .001" (25 micron) aluminum foil facing reinforced with a fiberglass scrim. An added UV stable, 39 mil high impact resistant titanium infused vinyl is factory bonded to the outer surfaces to provide a zero-permeability water tight barrier. The density of the foam shall not be less than 3.5 pcf with a minimum compressive strength of 28 psi

6. See HVAC Insulation specification section for required R-Value and provide associated panel thickness.

7. Closure Materials:

    a. UV stable 39 mil high impact resistant titanium infused vinyl (exterior).
        i. Factory manufactured seamless corners for zero perms.
        ii. Cohesive bonded over-lap at corner seam covers for zero perms.
        iii. Water resistant titanium infused welded vinyl seams.
        iv. Mold and mildew resistant.
    b. Polymeric Sealing System:
        i. Structural Membrane: Aluminum scrim with woven glass fiber with UV stable vinyl clad applied
        ii. Minimum Seam Cover Width: 2 7/8” inches (75 mm)
        iii. Sealant: Low VOC.

iv. Color: White unless otherwise specified.
v. Water resistant.
vi. Mold and mildew resistant.

8. Duct Connectors.

a. Factory manufactured cohesive bonded strips (low pressure only).
b. Factory manufactured all aluminum grip flange.
i. Grip flange
ii. F-flange
iii. H-flange
iv. U-flange

c. Factory manufactured galvanized 4-bolt flange.

9. Flange coverings: Flanges shall be field sealed airtight before flange covers are installed. Flange covering consists of the following:

a. Foam tape insulation with molded 39 mil covers.
b. Air gap (heating only application) with molded 39 mil covers.

10. Weight: Duct shall provide low weight stresses on the building framing and support members. Assembled duct shall have a weight of 0.86 lbs. per square foot to maximum weight of 2.7 lbs. per square foot (depending on R-value). Hangers and tie-downs are to be detailed on the manufacturer's installing contractors detail drawings prior to installation but not exceeding 13' for duct girth <84" and 8' for duct girth >85" between hangers and designed to carry the weight and wind load of the ductwork.

2.6 PVC DUCTS AND FITTINGS

A. Duct and Fittings:

1. Round duct: Comply with cell Classification 12454-B in ASTM D 1784 with external loading properties of ASTM D 2412

2. Round fittings: Socket end molded of same material, pressure class, and joining method as duct.

B. Joining Materials

1. Use PVC solvent cement that has a COC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24)

C. Fabrication:

1. Fabricate joints, seams, transitions, reinforcement elbows, branch connections and access doors and panels according to SMACNA's "Thermoplastic Duct (PVC) construction manual" Chapter 3, "Standards of Construction for PVC duct systems.

D. Drains: Formed drain pockets with a minimum of 1" threaded pipe connection.

2.7 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards – Metal and Flexible" for acceptable materials, material thickness and duct construction methods unless otherwise indicated.

B. See above for minimum duct thicknesses.

C. Sheet metal materials shall be free from pitting, seam marks, roller marks, stains, discolorations or other imperfections.

D. Galvanized sheet steel shall comply with ASTM A 653/A 653M. Finishes for surfaces exposed to view shall be mill phosphatized.

E. Stainless steel sheets shall comply with ASTM A 480/A 480M Sheet steel shall be type 304 unless otherwise noted, cold rolled, annealed sheet

233300 – AIR DUCT ACCESSORIES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct construction Standards – Metal and Flexible" for metal ducts and in NAIMA AH116 "Fibrous Glass Duct Construction Standards" for fibrous glass ducts.

B. Balancing dampers shall be provided in each supply air branch duct and all return and exhaust ducts required for complete balancing of air distribution system. Contractor shall provide remote damper adjustment method for all dampers located above drywall ceiling. All direct duct mounted grilles and registers shall be provided with volume damper.

C. Install duct accessories of materials to match duct materials.

D. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

E. Install volume dampers at all points on supply, return and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner and terminate liner with nosing hat channel.

F. Set dampers to fully open position before testing, adjusting and balancing.

G. Install test holes at fan inlets and outlets and elsewhere as indicated. Install duct test holes where required for testing and balancing purposes.

H. Install fire and smoke dampers according to UL listing.

I. Install flexible connections at all connections of ducts to equipment. For fans developing more than 5" WC cover flexible connectors with loaded vinyl sheet held in place with metal straps.

1.2 FIRE DAMPERS

A. Fire dampers and ceiling fire dampers shall be provided at all penetrations in fire rated assemblies shown on architectural plans.

B. Fire dampers rated for wall or floor installation shall not be used where ceiling fire dampers are indicated on plans, due to the fact that they do not provide the necessary heat barrier.

C. Fire damper installation shall be in accordance with all manufacturer's requirements and requirements of UL 555

PART 2 – PRODUCTS

2.1 BACKDRAFT DAMPERS

A. Dampers shall be gravity balanced suitable for maximum air velocity of 2000 feet per minute, unless otherwise noted on plans. Maximum system pressure rating shall be 1" WC. Dampers shall have extruded aluminum frame with multiple center pivoted single piece blades with a maximum blade width of 6 inches. Blade action shall be parallel and blades shall be equipped with nylon seals. Damper shall be equipped with adjustable tension return spring. Provide accessories as noted on plans.

2.2 MANUAL VOLUME DAMPERS

A. Dampers shall be rated for standard leakage rating with linkage outside of airstream. Damper shall be suitable for horizontal or vertical application. Damper frame shall be galvanized steel channel with mitered and welded corners. Damper shall be provided with flanges for attaching to walls or flangeless frames for installing in ducts. where applicable. Blade design shall be parallel or opposed blade design with galvanized steel damper blades. Provide galvanized steel blade axles. Dampers in ducts with pressure class of 3" WC or less shall have axles full length of damper blades and bearings at both ends of operating shaft. Provide 2" extended stand off bracket and locking hand quadrant. When applications require more than one damper section to fill opening, sections shall be interconnected by appropriate jack shafting.

2.3 CONTROL DAMPERS

A. Damper shall have low leakage rating with linkage outside of airstream and shall bear AMCA's certified ratings seal for both air performance and air leakage. Damper frame shall be constructed from galvanized steel channels with mitered and welded corners. Damper shall have parallel and opposed blade design with multiple dampers blades with a maximum blade width of 8". Blade axles shall be galvanized steel with blade linkage hardware of zinc plated steel and brass. Damper shall be rated for operation from -40 degrees to 200 degrees Fahrenheit.

2.4 FIRE DAMPERS

A. Fire rating shall match rating of fire separation indicated on architectural plans. See architectural plans for assembly rating requirements. Damper shall be dynamic type, rated and labeled according to UL 555 by a national rating and testing laboratory. Fusible links shall be rated for 212 degrees Fahrenheit and shall include a UL label in accordance with established UL labeling procedures. Dampers shall be suitable for vertical or horizontal installation as required by location shown. Fire dampers shall be installed in wall and floor openings utilizing steel sleeves, angles and other materials and practices as required to provide an installation equivalent to that utilized by the manufacturer when dampers were tested at UL. Damper shall be curtain type with blades outside of airstream, fabricated with roll formed galvanized steel with mitered and interlocking corners. Mounting sleeve shall be factory or field installed and constructed from galvanized sheet steel. Sleeve may be omitted where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements. Damper blades shall be roll formed, interlocking galvanized sheet steel. Contractor shall have option to use full length, galvanized steel blade connectors in place of interlocking blades. Horizontal dampers shall be equipped with blade lock and stainless stel closure spring.

1. Low Velocity: Dampers installed in low velocity ductwork shall be rated for air velocities of up to 2000 feet per minute at 4" WC static pressure.

2. Medium/High Velocity Dampers: Dampers installed in medium/high velocity ductwork shall be rated for air velocities of up to 4000 feet per minute at 8" WC static pressure. Dampers shall be equipped with airflow blades. Provide round or oval transitions as required per the routing shown on plans.

2.5 CEILING FIRE DAMPERS

A. Fire rating shall match rating of fire separation indicated on architectural plans. See architectural plans for assembly rating requirements. Dampers shall have passed UL test and shall be labeled for use in any fire-resisting floor or roof ceiling assembly with a restrained or un restrained assembly rating. Dampers shall be equipped with 165 degree fusible links. Units installed in T-Bar ceilings with flared openings larger than diffuser neck size shall be complete with UL classified thermal insulating blankets. Damper frame shall be galvanized sheet steel with round or rectangular style to suit ceiling construction. Damper blades shall be galvanized sheet steel with refractory insulation.

2.6 SMOKE DAMPERS

A. Smoke dampers shall be labeled according to UL 555S by a national rating and testing laboratory. Dampers shall be equipped with integral factory wired photoelectric smoke detector, wired for single point 120V power connection. Frame shall be curtain type with blades outside airstream; fabricated with roll formed galvanized steel with mitered and interlocking corners. Blades shall be roll formed, horizontal, interlocking type constructed from galvanized steel. Contractor shall have option of using full-length galvanized steel blade connectors in place of interlocking blades. Damper shall be rated for pressure and velocity class exceeding design airflow conditions. Mounting sleeve shall be factory installed galvanized sheet steel with length to suit wall or floor application. Provide factory furnished silicone caulking for use in sleeve installation. Dampers shall be two-position type. Provide auxiliary switch for signaling

B. Smoke Rating:

1. For velocities below 1000 feet per minute, damper shall be rated for leakage class II.

2. For velocities above 1000 feet per minute, damper shall be rated for leakage class I.

2.7 COMBINATION FIRE AND SMOKE DAMPERS

A. Provide dynamic type damper rated and labeled according to UL 555 and UL 555S by a national rating and testing laboratory. Damper shall be equipped with integral factory wired photoelectric smoke detector, wired for single point 120V power connection. Fusible link shall be replaceable type rated for 212 degrees Fahrenheit. Frame shall

be curtain type with blades outside airstream, constructed with galvanized steel with mitered interlocking corners. Blades shall be roll formed, horizontal interlocking type constructed with galvanized sheet steel. Contractor shall have option to use full-length galvanized steel blade connectors in place of interlocking blades. Damper pressure and velocity rating shall exceed that of design airflow conditions. Provide factory installed mounting sleeve constructed with galvanized sheet steel with length to suit wall or floor application. Provide factory furnished silicone caulking for use in sleeve installation. Dampers shall be two-position type. Provide auxiliary switch for signaling.

1. For velocities below 1000 feet per minute, damper shall be rated for leakage class II.
2. For velocities above 1000 feet per minute, damper shall be rated for leakage class I.

2.8 DUCT MOUNTED ACCESS DOORS

A. Access panels shall be fabricated according to SMACNA's "HVAC Duct Construction Standards – Metal and Flexible" Figures 2-10 "Duct Access Doors and Panels" and 2-11 "Access Panels – Round Duct".

1. Door shall be double wall, rectangular constructed of galvanized sheet metal with insulation fill and thickness as indicated on duct insulation schedule. Door shall be hinged with cam latch and shall be fabricated air tight, suitable for duct pressure class. Frame shall be galvanized sheet steel with bend over tabs and foam gaskets.
2. Pressure relief access doors shall open outward for positive pressure and inward for negative pressure ducts. Doors shall be factory set for operation at 10" WC and shall be equipped with neoprene or foam rubber seam.

2.9 DUCT ACCESS PANEL ASSEMBLIES

A. Assemblies shall be rated and labeled according to UL 1978 by a national rating and testing laboratory. Panel and frame shall be carbon steel with carbon steel fasteners. Panel fasteners shall not penetrate duct wall. Gasket shall comply with NFPA 96 and shall be constructed with grease tight, high temperature ceramic fiber rated for minimum 2000 degree Fahrenheit. Minimum pressure rating shall be 10" WC positive or negative.

2.10 FLEXIBLE CONNECTORS

A. Connectors shall be constructed with flame retardant treated or non-combustible fabrics. Coatings and adhesives shall comply with UL 181, class I. Connectors shall be metal edged, factory fabricated with a fabric strip 3.5" wide attached to 2 strips of 2.75" wide galvanized sheet steel or aluminum sheets to match duct construction material. Strips shall be stainless steel when used in corrosive environments. Indoor system flexible connector fabric shall be glass fabric, double coated with neoprene. Outdoor system flexible connector fabric shall be glass fabric, double coated with weatherproof, synthetic rubber resistant to UV rays and ozone. High corrosive flexible connector fabric shall be glass fabric with chemical resistant coating.

2.11 DUCT SECURITY BARS

A. Security bars shall be furnished with 10 gauge x 2" frame, 3/16" bent steel frame with 1x1 angle frame factory welded to 1 end. Bars shall be suitable to be poured in place or set with concrete block or welded or bolted to wall from one side only with duct connections on both sides. Bars shall be 0.5" thick unless noted otherwise on plans. Bar spacing shall be 6". Mounting shall be as required for location installation indicated on plans.

233423 - POWER VENTILATORS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Field verify duct sizes, locations, and conditions for compliance with installation requirements prior to rough-in. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Install power ventilators level and plumb.

C. Secure roof-mounting fans to roof curbs with corrosion resistant hardware as recommended by manufacturer.

D. Ceiling Units: Suspend units from structure; use steel wire or metal straps.

E. Support suspended units from structure using threaded steel rods and rubber isolators.

F. Install units with clearances for service and maintenance.

G. Label units according to specification.

H. Make final duct connections with flexible connectors.

I. Install ducts adjacent to power ventilators to allow service and maintenance.

J. Electrical connection shall be done in accordance with local electrical code.

K. Perform the following field tests and inspections and prepare test reports upon request by A/E:

1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.

3. Verify that cleaning and adjusting are complete.

4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.

5. Adjust belt tension.

6. Adjust damper linkages for proper damper operation.

7. Verify lubrication for bearings and other moving parts.

8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.

9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.

10. Shut unit down and reconnect automatic temperature-control operators.

11. Remove and replace malfunctioning units and retest as specified above.

12. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

PART 2 – PRODUCTS

2.1 CENTRIFUGAL ROOF/WALL VENTILATORS

A. Description: Direct- or belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

B. Housing: Removable, spun-aluminum, dome top and outlet baffle, one-piece, aluminum base.

C. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains and grease collector, if scheduled.

D. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.

E. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

F. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.

2. Shaft Bearings: Field serviceable bearings.

3. Pulleys: Cast-iron, adjustable-pitch motor pulley.

4. Self-adjusting belt tensioner.

5. Fan and motor isolated from exhaust airstream.

G. Accessories:

1. Disconnect Switch: Factory wired through an internal aluminum conduit with thermal overload protection where scheduled.

2. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.

3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.

4. Provide additional accessories as scheduled.

H. Roof Curbs, as required for roof mount applications: Galvanized steel; mitered and welded corners; 1-1/2-inch-(40-mm-) thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to suit roof opening and fan base.

1. Coordinate curb height with roof deck construction and insulation thickness. Provide sloped roof curbs as required for a plumb and level fan installation.

2. Provide additional roof curb accessories as scheduled.

2.2 CEILING-MOUNTING VENTILATORS

A. Description: Centrifugal fans designed for installing in ceiling or wall or for concealed in-line applications.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Material as scheduled, louvered grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Disconnect Means

2. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.

3. Isolation: Rubber-in-shear vibration isolators.

4. Provide additional accessories as scheduled.

2.3 IN-LINE CENTRIFUGAL FANS

A. Description: In-line, direct/belt-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.

B. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

C. Direct-Driven Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing.

D. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.

E. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
2. Shaft Bearings: Field serviceable bearings.
3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
4. Self-adjusting belt tensioner.
5. Fan and motor isolated from exhaust airstream.

F. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.

G. Accessories:

1. Disconnect Switch: Nonfusible type, with thermal-overload protection, factory wired.
2. Companion Flanges: For inlet and outlet duct connections.
3. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

2.4 PROPELLER FANS

A. Description: Direct- or belt-driven propeller fans consisting of fan blades, hub, housing, orifice ring, motor, drive assembly, and accessories.

B. Housing: Galvanized-steel sheet with flanged edges and integral orifice ring with baked-enamel finish coat applied after assembly.

C. Steel Fan Wheels: Formed-steel blades riveted to heavy-gage steel spider bolted to cast-iron hub.

D. Retain paragraph above or first paragraph below. Aluminum blades below are normally used in large sizes and in high-static-pressure applications.

E. Fan Wheel: Replaceable, [cast] [extruded]-aluminum, airfoil blades fastened to cast-aluminum hub; factory set pitch angle of blades.

F. Belt-Driven Drive Assembly: Resiliently mounted to housing, statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.

1. Service Factor Based on Fan Motor Size: 1.4.
2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
3. Shaft Bearings: Field serviceable bearings.
4. Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.
5. Motor Pulleys: Adjustable pitch, select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
6. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
7. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.

G. Accessories:

1. Gravity Shutters: Aluminum blades in aluminum frame; interlocked blades with nylon bearings.
2. Motor-Side Back Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance.

3. Wall Sleeve: Galvanized steel to match fan and accessory size.

4. Disconnect Switch: Nonfusible type, mounted inside fan housing, factory wired through an internal aluminum conduit, thermal overload protection where scheduled.

5. Provide additional accessories as scheduled.

2.5 MIXED FLOW INDUCED DILUTION FAN

A. Provide for laboratory exhaust applications.

B. Fan manufacturer shall furnish a certificate of guarantee stating that the fan, mixing plenum, outlet nozzle, stack extension if any, and all related accessories specified herein have been pre-tested at the factory and that the fan curves supplied have been derated for any and all system effects created by the accessories.

C. Impellers shall be mounted directly to the motor shaft to provide a direct drive, Arrangement 4 type fan. Motors shall be isolated from the primary exhaust air stream and shall be visible and accessible from the fan exterior for inspection and service.

D. Mixed flow impellers shall consist of combination axial/backward curved blades and shall be of welded steel construction. The impellers shall have non-stall and non-overloading performance characteristics with stable operation at any point on the fan curves.

E. Stationary discharge guide vane sections shall be provided to increase fan efficiencies.

F. Fan dynamic balance not to exceed 0.5 mil, peak to peak, at the blade pass area when operating at fan frequency. Vibration isolation shall be limited to rubber-in-shear pad type isolators.

G. Fan assemblies shall be designed for mounting on conventional roof curb without the need for guy wire supports.

H. Discharges shall include twin FRP nozzles with passive third central stacks that are capable of generating aspiration. The FRP shall be chemically and UV resistant.

I. Steel entrainment windbands shall provide secondary induction of outside air. Induction shall take place downstream of the fan impeller and shall not influence BHP or static pressure requirements. Windbands shall discharge up to 270% of the design flow rates. The manufacturer shall publish discharge volumes for all fans at specified primary exhaust flow.

J. A non-ferrous inlet bell shall be provided in order to reduce sparking in the event of a motor bearing failure.

K. Fans shall be modular construction and capable of being assembled on the roof.

L. Chemical resistant gaskets shall be provided at all companion flanged joints.

M. Fasteners shall be 316 stainless steel.

N. A bolted access door shall be provided for impeller inspection on each fan.

O. Fans and accessories shall have internal drain systems to prevent rain water from entering building duct system.

P. Electric motors shall be TEFC high efficiency with a 1.15 service factor and an L-50 bearing life of 200,000 hours. Motors shall have sealed bearings up through a 256T NEMA frame. Motors shall comply with efficiencies listed in U.S. Energy Policy Act of 1992.

Q. Coatings-All steel and aluminum surfaces shall be prepared for coating by blasting or chemical etching. Coating will be Epoxy (8-10 mils) for protection against weather, chemical vapors and splashes. Color shall be selected by Architect from manufacturer's standard color chart.

R. ACCESSORIES

1. Inlet mixing plenum shall be provided by the fan manufacturer. Plenum shall be sized to support the weight and performance requirements of the number of fans listed on the schedule. Multiple fan plenum shall be insulated double wall construction with structural stiffeners or shall be continuously welded, heavy gauge single wall construction. Outer skin of double wall plenums shall be coated 12 gauge Galvaneal steel. Inner skin shall be uncoated 18 gauge 316 stainless steel. Multiple fan plenums shall be able to withstand a minimum of 12 in w.g. of negative pressure. All plenums shall be capable of supporting the fan(s) without

guy wires or supports. The plenums shall include hinged access doors and safety screens over primary air inlets. The primary air inlets shall be located on the side as noted on construction drawings. Coatings shall be the same as specified for the fans. Inlet mixing plenum shall be capable of mounting four (4) fans (mounted in a 2 wide by 2 high arrangement). Unless otherwise specified, plenums shall be suitable for mounting on roof curbs.

2. Primary air inlets shall be designed to accept future heat reclaim coils. A removeable panel(s) shall be integrated into the plenum design such that when removed a flanged heat reclaim module can be easily attached. Minimum future opening size to be 44”h x 106”w. The present duct size is shown on the construction drawings. Plenum floor drains shall be provided.

    a. Stainless safety screens shall be supplied over inlet of fan.

3. Bypass dampers shall be provided with all mixing plenums for outside air with primary exhaust. Dampers will be opposed blade low leakage air foil control dampers with extended shaft for connection to an operator. The dampers shall be all aluminum construction. Rain hoods shall be provided with each damper. The dampers shall be controlled by a 20 psi pneumatic operator. The operators shall be provided by the fan manufacturer.

4. Low leakage isolation dampers shall be constructed of aluminum air foil extrusions and coated with epoxy. Operator shall be 2 position, spring return and shall be 110V electric. The electric operator shall be interlocked with the respective fan motor starter to open when the fan is energized and close via a spring return when de-energized. When the fan ships separate from the plenum, all wiring and conduit shall be factory supplied for easy connection in the field. Provide quantity required for balancing and operation of fan.

5. Vortex breakers shall be provided on all side inlet and multiple fan plenums.

6. A 14-gauge galvanized steel roof curb shall be provided to support the fans/plenums. The curb shall be minimum 14 gauge and canted for rigidity in wind loads. The curb shall be 12" high. The curb shall include a rigid fiberglass liner and a wood nailer.

233713 – GRILLES, REGISTERS AND DIFFUSERS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Install diffusers, registers and grilles level and plumb.

B. Drawings indicate general arrangement of ducts, fittings and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay in ceiling panels, locate units in center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers and grilles with airtight connections to ducts and allow service and maintenance of dampers, air extractors and fire dampers.

D. Adjust diffusers, registers and grilles to air patterns indicated, or as directed, before starting air balancing.

E. Install all registers with curve of louver away from line of sight to eliminate sight lines into space behind louver.

F. Registers installed in masonry shall be installed so that bottom of register is aligned with masonry joint.

G. Support all grilles, registers and diffusers from T-Bars or structure so that weight of unit is not transferred to ceiling tile.

H. Provide proper mounting accessories for mounting method required in area in which diffuser is shown. See architectural plans for ceiling or wall type.

I. All registers and grilles shall have angled blades.

PART 2 – PRODUCTS

2.1 CEILING DIFFUSERS

A. Diffuser shall be constructed of steel

B. Diffuser shall be specifically designed for variable volume air flows.

C. Finish shall be baked enamel with color as indicated in diffuser schedule.

D. Diffuser airflow pattern shall be adjustable in field.

E. Volume dampers, where indicated on schedule shall be radial opposed blade or butterfly type.

2.2 LINEAR SLOT DIFFUSERS

A. Diffuser shall be constructed of aluminum.

B. Diffuser shall be specifically designed for variable volume air flow.

C. Slots, width and unit length shall be as indicated on plans.

2.3 DUCT MOUNTED DIFFUSER

A. Diffuser shall be constructed of heavy gauge aluminum.

B. Finish shall be baked acrylic suitable for paint. Or color as indicated in diffuser schedule.

C. Blades shall be individually adjustable in the horizontal direction.

D. Diffuser shall be furnished with opposed blade steel damper and adjustable air extractor.

E. Furnish diffuser with duct mounting collar.

2.4 REGISTERS AND GRILLES

A. Units shall be constructed as follows:

1. Where unit is indicated to be furnished with white finish, or to receive paint, unit shall be constructed of steel.
2. Where unit is to be located in corrosive environment, or is indicated to have a “matte” finish, unit shall be constructed of aluminum.

B. Register shall be equipped with adjustable opposed blade damper.

C. Mounting screws shall be concealed.

237433 – DEDICATED OUTSIDE AIR UNITS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Install unit on roof curb level and secure Coordinate roof penetrations and flashing with specified roof construction. See roof curb specifications for roof curb requirements.

B. Install condensate drain, minimum connections size with trap and indirect connection to nearest roof drain or area drain unless shown otherwise on plans.

C. Install all piping adjacent to units to allow service and maintenance.

D. Install ducts to termination at top of roof curb.

E. Remove roof decking only as required for passage of ducts. Do not cut out roof decking under entire roof curb.

F. Connect supply air ducts to units with flexible duct connectors

G. Install return air duct continuously through roof structure.

H. Install normal weight concrete mix inside roof curb 4” thick. See concrete specifications for formwork and reinforcement specifications.

I. After completing system installation and testing, adjusting and balancing unit and air distribution systems, clean filter housings and install new filters.

1.2 FIELD STARTUP, CONFIGURATION AND ADJUSTMENT

A. Engage a factory authorized service representative to inspect, test and adjust components, assemblies and equipment installations including connections and to observe unit startup and assist in testing. Factory startup report for each unit shall be available for inspection upon request by A/E.

PART 2 – PRODUCTS

2.1 GENERAL

A. Provide capacities, accessories, voltages, etc. as listed in equipment schedule on drawings.

B. Unit shall meet minimum efficiencies of local codes or rating system requirements applied to project

C. Where convenience receptacles are shown on plans, receptacles shall be factory wired with all required transformers and wiring to provide 120V power without requiring a separate electrical circuit.

2.2 CASING

A. Exterior Casing shall be galvanized steel with factory painted finish with pitched roof panels and knockouts with grommet seals for electrical piping connections.

B. Casing insulation shall provide a minimum insulation value of R-13. Insulation liner shall have air stream surface coated with an erosion and temperature resistant coating or shall be faced with a plain or coated fibrous mat of fabric.

C. Service doors shall be hinged and gasketed.

D. Surfaces in contact with airstream shall comply with the latest edition of ASHRAE 62.1

E. Drain pan shall be stainless steel or non-corrosive polycarbonate material. Pan shall be equipped with threaded nipple on both sides of drain pan.

F. Unit shall be equipped with removable coil guard.

2.3 FANS

A. Fans shall provide airflow and external static pressure as listed in equipment schedule.

2.4 REFRIGERATION SYSTEM

A. Refrigerant coil: Coil shall be aluminum plate fin and seamless copper tube with brazed joints

B. Capacity Control: Unit shall be capable of unloading to at maximum of 10% of rated capacity of unit. Unit shall use variable speed compressors for unloading capabilities for true reduction of input power when unit is operating at partial capacity. Capacity control shall be fully integrated with hot gas reheat system to provide adequate capacity for dehumidification requirements and reheat.

C. Reheat Requirements: Unit shall utilize hot gas reheat coil to provide discharge air temperature and relative humidity indicated on plans. Unit discharge air temperature shall vary no more than +/- 5 degrees from specified discharge air temperature. Unit discharge air humidity shall vary no more than +/- 5% from humidity specified on plans. Regardless of relative humidity specified on plans, in no case shall unit discharge air at relative humidity greater than 60%.

D. Unit shall be charged with R-410A or R-407C refrigerant.

E. Refrigerant circuit shall be equipped with all accessories required for specified operation including, but not limited to expansion valve, filter/dryer, manual reset high pressure safety switch, automatic reset low pressure safety switch, minimum off time delay relay, automatic reset compressor motor thermal overload, brass service valves in suction and liquid lines and low ambient high-pressure sensor.

F. Refrigeration system shall be equipped with VFD head pressure control to sense pressure in refrigerant circuit and operate heat rejection fans to control pressure as needed.

2.5 HEATING SYSTEM

A. Electric Resistance Heat: Where electric heat is specified in schedule, electric heating coil resistance wire shall be supported and insulated by floating ceramic bushings recessed into casing openings. Terminate elements in stainless steel machine staked terminals secured with stainless steel hardware. Coil shall be equipped with over temperature protection, factory installed overcurrent protection and control panel to provide stages as indicated on plans

B. Gas furnace: Where gas heat is specified in schedule the following requirements shall be met.

1. Gas burners shall be stainless steel with electronically controlled electric spark or hot-surface igniter with flame sensor

2. Heat exchanger shall be stainless steel.

3. Venting system shall be interlocked with gas valve.

2.6 HYDRONIC COILS

A. Where hot and/or chilled water system is specified on plans coils shall be cleanable coils, fabricated and tested according to ARI 410 with aluminum fins and seamless copper type in galvanized casing. Coil headers shall match pipe material and fittings as specified on piping materials schedule.

2.7 ENERGY RECOVERY WHEEL

A. Energy recovery wheel shall be enthalpy type wheel with washable medium, and galvanized frame.

B. Unit shall be equipped with integral frost protection and sequence for protection of wheel.

C. Cross leakage purge shall be appropriate for application of exhaust system. Non-hazardous exhaust shall be purged with approximately 5% of supply airflow. Hazardous exhaust shall be purged with approximately 20% of supply airflow

D. Energy transfer medium shall be designed and treated to resist mold or other fungal growths.

2.8 OUTDOOR AIR INTAKE

A. Damper operation shall be electric, parallel blade galvanized steel dampers. Outdoor air hoods shall be galvanized steel to match finish of casing and shall be equipped with bird screen. Where airflow-monitoring stations are specified on plans or in controls specification, provide hood extension for 4’ of straight run before airflow enters unit. Hood extension shall be suitable for installation of monitoring station, and construction shall match that of unit casing.

2.9 POWER CONNECTION

A. Provide for single connection of power to unit with control circuit transformer with built in overcurrent protection. Unit shall be equipped with factory mounted disconnecting means.

B. Unit electrical system shall be rated for minimum available fault current to 5000 Amps.

2.10 CONTROLS

A. See specification section for HVAC temperature controls. Mechanical contractor shall coordinate requirement of control specifications and equipment provided to ensure that all control points, and sequences of operation requirements are satisfied, and that equipment is compatible with control system. See drawings for sequences of operations.

238126 – SPLIT SYSTEMS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 EQUIPMENT REQUIREMENTS

A. Indoor units, outdoor units and evaporator coils shall all be by the same manufacturer, and performance shall be rated by the manufacturer in the configuration that is being supplied.

B. Unless otherwise noted below or in equipment schedule, equipment efficiencies shall meet or exceed requirements of local codes.

1.2 INSTALLATION REQUIREMENTS

A. Install units level and plumb.

B. Install evaporator fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Provide concrete housekeeping pad for installation of indoor and outdoor units

D. Install all piping and ductwork adjacent to equipment to allow service clearance

E. Install vent and outside air connections with cap and in an arrangement that will protect against the entry of birds, insects and dirt.

F. Connect ducts to ducted indoor units with flexible duct connection

PART 2 – PRODUCTS

2.1 GAS HEATING INDOOR UNIT

A. Provide unit capacities and accessories as shown in equipment schedule.

B. Gas fired furnace shall have an efficiency of 90% or greater with sealed combustion and direct vent flue gas venting.

C. Gas furnace shall be electric pilot ignition type with hot surface igniter or electric spark ignition. Burner shall be equipped with electronic flame sensor, flame rollout switch, and temperature limit control. Main gas valve shall be 100 percent safety type with main shutoff valve and pressure regulator.

D. Cabinet shall be steel finished with baked enamel with removable panels.

E. Evaporator coil shall be copper tube with mechanically bonded aluminum fins.

F. Surfaces in contact with airstream shall comply with latest version of ASHRAE 62.1.

G. Airflow configuration shall be as required by duct routing and unit orientation shown on plans.

H. Provide filter section on return air connection of unit, unless noted elsewhere on plans. Contractor shall have option of field fabrication of filter section, or integral factory constructed filter section. If specific filter location is noted on plans, contractor shall field fabricate filter section where located on plans.

2.2 OUTDOOR CONDENSING UNIT / HEAT PUMP

A. Provide unit capacities and accessories as shown in equipment schedule.

B. Casing shall be steel finished with baked enamel with removable panels for access to controls, weep holes for drainage and mounting holes in base.

C. Compressor shall be mounted on vibration isolation and shall be hermetically sealed. Compressor motor shall have thermal and current sensitive overload devices, start capacitor, relay and contactor.

D. Unit shall be equipped with removable coil guard.

E. Refrigerant coil shall be copper with aluminum fins.

F. Fan shall be aluminum directly connected to fan motor.

G. Heat pumps shall be equipped with reversing valve and low-temperature air cut-off thermostat with field adjustable temperature setting.

2.3 WALL/CEILING MOUNTED DUCTLESS INDOOR UNIT

A. Provide unit capacities and accessories as shown in equipment schedule.

B. Provide stainless steel or polymer drain pan. Mount coil over drain pan.

C. If specified with integral heater, provide finned tube electric heating element with high limit temperature switches.

D. Provide unit capacities and accessories as shown in equipment schedule.

E. Provide stainless steel or polymer drain pan. Mount coil over drain pan.

F. If specified with integral heater, provide finned tube electric heating element with high limit temperature switches

2.4 REFRIGERANT LINE-SETS

A. See piping specification for material requirements.

B. See insulation specification for insulation requirements.

C. Contractor shall size and route line-sets according to all manufacturers recommendations. Provide accumulators, line dryers and all accessories required for proper compressor operation based on equipment and line-set configuration.

2.5 CONDENSATE PUMP

A. Where condensate pump is indicated on plans, or required by piping routing shown on plans provide condensate pump integral to unit. Contractor shall have option to provide factory mounted or field installed condensate pump.

B. When unit is not available with integral condensate pump, provide pump with 120V, 1-phase cord and plug power supply, integral start/stop and high water safety switch, low profile design, overflow safety switch lead wires and built in wall mount tabs.

238127 – VARIABLE REFRIGERANT SPLIT SYSTEMS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. All equipment shall be installed by manufacturer factory trained contractor with a minimum of two personnel certified by manufacturer. Contractor shall have complete knowledge of installation requirements prior to bid. Technician shall have minimum of five years of experience in HVAC service and must be certified by equipment manufacturer for commissioning, service, troubleshooting and controls of equipment. Documentation indicating certifications have been obtained and are up to date shall be submitted with submittal documents.

B. Contractor shall engage a factory certified technician to perform startup service.

C. All equipment shall be installed in accordance with manufacturer's requirements and recommendations for best practice.

D. All equipment shall be stored protected from weather, extreme temperature, etc as suggested by the manufacturer. All equipment shall be transported, moved and set in accordance with manufacturer's recommendations.

E. Fan coil units shall be supported with manufacturer's standard mounting devices and secured to building structure.

F. Install piping adjacent to unit to allow service and maintenance.

G. Drawings indicate general arrangement of ducts. Connect supply and return ducts to indoor units with flexible duct connectors.

H. Ground equipment according to manufacturer's requirements and requirements of division 26.

I. Outdoor units shall be installed in such a way as to achieve optimal drainage.

J. All equipment and distribution devices shall be installed with adequate clearance to allow access to all required service access openings.

K. All refrigerant lines shall be individually insulated for the full length of the lineset. See HVAC piping insulation specification section for more information.

L. Contractor shall acquire all manufacturer certifications required for compliance with warranty program.

M. Contractor shall adjust airflow throw pattern of all ductless indoor units as required for optimal coverage of space. Adjustments shall account for ceiling height, shape of room, obstructions in room and opposing airflow patterns from other air terminal devices.

N. After refrigerant installation contractor shall perform leak test of all refrigerant piping. System shall be tested at 605 psi and shall hold pressure for 24 hours. All piping shall be triple evacuated to 500 microns or less.

O. Provide oil traps in refrigerant line sets as recommended in manufacturers installation instructions.

1.2 DEMONSTRATION

A. Engage a factory authorized trainer and technician to train Owner to adjust, operate and maintain equipment. Training shall consist of 4 hours after system commissioning and adjustment is complete and two additional hours, two months after date of substantial completion.

PART 2 – PRODUCTS

2.1 AIR SOURCE OUTDOOR HEAT PUMP

A. Provide all capacities listed in schedule. Fan airflows shall be allowed maximum ten percent variation from specified airflows.

B. Unit shall be equipped with high pressure safety switch, overcurrent protection, crank case heater and DC bus protection.

C. Unit shall be equipped with all refrigerant accessories required for system configuration shown on plans. This includes all accessories required for elevation differences between outdoor unit and connected air handling units.

D. Unit shall be capable of operating in heating mode at -12 degrees Fahrenheit ambient temperature and shall deliver heat without lockout. Unit shall be capable of operating in cooling mode at 25 degrees Fahrenheit ambient temperature. When unit is specified with low ambient cooling kit, unit shall be rated for cooling performance to 10 degrees below 0 Fahrenheit.

E. Unit shall be equipped with all required accessories for compressor oil lubrication protection.

F. Unit casing shall be constructed of galvanized or mild steel with baked enamel finish. Unit shall be corrosion resistant, weatherproof and suitable for outdoor installation.

G. Outdoor coils shall be equipped with hail guards

H. Condenser fan shall be propeller type and shall be equipped with raised fan guard. Motor bearings shall be permanently lubricated.

I. Condenser coil shall be constructed of copper tubes expanded via mechanical bond into aluminum fins. Coil shall be equipped with corrosion resistant coating and steel coil guard.

J. Compressor shall be scroll type with inverter for capacity control modulation. Compressor shall be mounted with vibration isolation to prevent transmission of compressor vibration to unit casing. Compressor shall be capable of turn down to 20% of total unit capacity.

K. Refrigeration system shall be equipped with VFD head pressure control to sense pressure in refrigerant circuit and operate heat rejection fans to control pressure as needed.

L. Unit shall be suitable for service at electrical voltage shown on equipment schedule.

M. Maximum sound rating shall be 60 dB(A) measured within 12” of the unit.

N. Provide all accessories listed in equipment schedule.

O. Unit shall be factory assembled, piped and wired and shall be run tested at factory.

P. All capacities shall be AHRI certified for project configuration conditions.

2.2 INDOOR UNITS

A. Unit shall be factory assembled, wired, piped and run tested.

B. All exposed indoor unit casings shall have matching finish regardless of model or mounting type.

C. Units shall be equipped with multidirectional drain and refrigerant piping connections. Piping shall be connected as required by configuration shown on plans.

D. Coil shall be constructed via non-ferrous construction with smooth plate fins on copper tubing. All tube joints shall be brazed with phos-copper or silver alloy. Coil shall be pressure tested at factory.

E. Unit shall be equipped with condensate drain pan beneath unit coil. And shall be furnished with all interlocks to shut down the unit in an overflow condition and signal an overflow alarm condition.

F. Unit shall be suitable for service at electrical voltage shown on equipment schedule.

G. Indoor unit and refrigerant pipes shall be charged with dehydrated air prior to shipment from the factory.

H. Provide insulation kit for insulation of equipment refrigerant piping connections.

I. In addition to requirements listed above, specific unit types shall be equipped with the following features:

1. Wall Mounted Units: Provide separate backplate for mounting of unit to the wall. Fans shall be line flow type, and shall be driven with a single direct drive motor with permanently lubricated bearings. Unit shall be equipped with manual adjustable guide vane to adjust airflow distribution pattern from left to right. Filter shall be removable and washable, and shall require no tools to access filter.

2. Ceiling Cassette Units: Units shall be equipped with individually adjustable grille vanes in each flow direction. Grille shall be field convertible between two, three and four way throw. Cabinet shall be fully recessed above ceiling. Unit shall be equipped with connection for branch ducting. Fan shall be driven by a single motor with permanently lubricated bearings. Fan shall be equipped with control logic to automatically adjust fan speed

based on space temperature and set point. Unit shall be equipped with long life washable return air filter. Unit shall be equipped with an integral condensate lift mechanism as required for condensate drain routing shown on plans. When listed as an accessory in the schedule, unit shall be equipped with provisions for filtered outside air connection.

3. Ducted Indoor Units: Cabinet shall have provisions for a field installed filtered outside air intake. Fan units shall be driven by a direct drive motor with permanently lubricated bearings. Unit shall be equipped with factory installed filter box. Filters shall be as required by filter specification. Fan speed shall be field adjustable for installed external static pressure conditions. Unit shall be equipped with duct connections as required for duct layout shown on plans.

4. Vertical/Horizontal Ducted Indoor Unit: Unit shall be suitable for mounting in either vertical or horizontal position as shown on plans. Unit cabinet shall be factory insulated and factory painted with powder coating paint. Contractor shall provide field fabricated filter rack.

2.3 REFRIGERANT DISTRIBUTION DEVICE

1. These devices shall include “Branch Selectors” or “Branch Circuit Controllers” as labeled on plans.

2. Each Refrigerant Distribution devices shall be equipped with one spare set of branch connections. Capped for future use.

3. Devices shall be factory assembled, piped and wired and shall be run tested at factory.

4. Device shall be equipped with tube in tube subcooling heat exchanger.

5. Casing shall be galvanized steel suitable for indoor installation.

6. Contractor shall be responsible to provide condensate drain piping for all refrigerant distribution devices not shown on plan.

7. Device shall be suitable for service at electrical voltage shown on plans.

8. Device shall be equipped with all controls required for integration with outdoor unit operation.

2.4 CONTROLS

A. Equipment shall be compatible with specified building controls system and shall communicate all points listed on controls drawings to controller provided by controls contractor via communication protocol listed in controls specifications.

B. Thermostat: Wall thermostat shall display room temperature, room temperature set point and equipment operating mode. Thermostat interface shall have locking features to prevent unauthorized adjustment.

2.5 REFRIGERANT

A. Refrigerant shall be R410A.

2.6 OUTDOOR UNIT SUPPORT RAILS

A. All units shall be supported with a stand. Lower section of support system shall be formed steel frame. Upper frame shall provide continuous support along the bottom of the unit and shall remain captive, resiliently resisting seismic and wind forces. All directional neoprene snubber bushings must be a minimum of 1/4" thick.

B. Stand shall support the unit at least 12” off the ground.

C. Stand shall be equipped with rubber anti-vibration pads.

239000 – LOUVERS AND VENTS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Verify actual dimensions of openings by field measurements before fabrication.

B. Locate and place louvers and vents level, plumb and at indicated alignment with adjacent work.

C. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather tight connection.

D. Form closely fitted joints with exposed connections accurately located and secured.

E. Provide perimeter reveals and openings of uniform width for sealants and joint fillers as indicated.

F. Repair finishes damaged by cutting, welding, soldering and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory for refinish or replacement

G. Protect unpainted galvanized and non-ferrous metal surfaces that will be in contact with concrete, masonry or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

H. Install concealed gaskets, flashings, joint fillers and insulation as louver installation progresses, where weather tight louver joints are required.

I. Provide louver finish as indicated on architectural plans and elevations.

PART 2 – PRODUCTS

2.1 FIXED, EXTRUDED ALUMINUM AND FORMED METAL LOUVERS

A. Louvers shall be 6” deep with extruded aluminum drainable blades, at 35 degree angle and spaced on 3.5” centers. Jambs shall be constructed with integral downspouts for carrying water from the blades to the louver sill. Screens shall be provided on the interior of the louver and shall consist of 0.5” mesh wire mounted in aluminum frame. Louvers shall pass 1100 FPM free area velocity with less than 0.19” water pressure drop and shall carry less than 0.1 ounces per square foot of water during a 15 minute period when tested in accordance with AMCA 500. Lovers shall bear the AMCA certified ratings.

2.2 FEMA RATED LOUVER

A. Provide louver compliant with FEMA 361 Standard for Design and Construction of Community Shelters, zone IV criteria, 250 MPH wind, 15 lb. 2x4 impact at 100 mph. Louver shall be designed to withstand 266 psf. Louver shall be mounted externally in combination with wall louver or by itself internally. Minimum free area shall be 53%.

B. Frame shall be 1”x8”x4” ¼” thick hot rolled steel. Blades shall be 3”x3”x1/4” thick chevron style hot rolled steel. Equip with bird screen.

C. Anchor according to manufacturer recommendations for compliance with FEMA 361 standards.

D. Installation of louver shall be subject to FEMA special inspection.

2.3 BLANK OFF PANELS

A. Blank off panels shall be 1” thick insulated type with Aluminum sheet not less than 0.032” nominal thickness. Insulating core shall be rigid glass fiberboard insulation or extruded polystyrene foam. Trim perimeter edges of blank off panels with louver manufacturer’s standard frames. Corners shall be mitered with same finish as panels. Seal perimeter joints between panel faces and louver frames with gaskets of sealant. Panel finish shall be same finish applied to louver but black in color. Attach blank off panel with sheet metal screws.

2.4 BRICK VENTS

A. Brick vents shall be constructed with extruded aluminum louvers and frames not less than 0.125” nominal thickness, assembled by welding with mesh aluminum insect screening on inside face. Vents shall incorporate

weep holes, continuous drip sill and integral waterstop on inside edge of sill. Vent shall be of load bearing design and construction.

260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 CODE SECTIONS

A. 2011 National Electrical Code, NFPA 70

B. 2012 International Building Code

C. 2012 International Plumbing Code

D. ADA – American Disabilities Act

E. ANSI – American National Standards Institute

F. ASTM – American Society of Testing Materials

G. NFPA – National Fire Protection Association

H. NEMA – National Electrical Manufactures Association

I. OSHA – Occupational Safety and Health Act

J. UL – Underwriter's Laboratories

K. All codes listed on architectural Code Reference Sheet or project cover sheet.

1.2 GENERAL

A. Provide all work in accordance with applicable codes, rules, ordinances, and regulations of local, State, and Federal Governments and other Authorities Having Jurisdiction (AHJ).

B. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the drawings and specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system functioning as indicated by the design and the equipment specified. Elements of the work include materials, supervision, supplies, equipment, transportation, and utilities.

C. The drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The contractor shall use the drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system. Plans shall not be scaled

D. Contractor shall coordinate with all other trades to ensure that all required project components are included in project bid.

E. If in any case the plans or specifications conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

F. If in any case the plans or specifications conflict with themselves, the most stringent of the conflicting information shall be the basis for bid. Contractor shall seek clarification of all conflicts prior to bid.

G. All change order requests shall be accompanied with itemized tabular breakdown of all materials and labor associated with installation of all associated materials for review of the design team. Lump sum pricing will not be accepted.

H. Contractor shall refer to each drawing and specification section in construction document set. No bids shall be submitted without review of all construction documents.

1.3 ALLOWABLE MANUFACTURERS

A. Allowable manufactures for all products listed in division 26 are listed in "Schedule of Manufacturers" on plans.

1.4 SUBMITTAL REQUIREMENTS

A. Submittals for products in division 26 shall include the following items.

1. Product data showing type, model and construction characteristics of product

2. Layout drawings for any systems requiring interconnection of various system components

3. All other documentation required to show compliance with the specifications.

B. Contractor shall allow a minimum of ten working days for design team of review of submittals.

1.5 WARRANTY REQUIREMENTS

A. Unless noted elsewhere in the specifications, all work shall be warrantied for a period of not less than one year from the date of substantial completion. The contractor shall provide work at no additional cost to correct any deficiencies in their work that were identified to have been present during the warrantied period.

1.6 DEMOLITION

A. All equipment to be removed and reinstalled shall be disconnected, with services capped, cleaned and stored for reconnection.

B. Information on drawings represents information from old drawings and limited site inspection. Contractor shall field verify existing conditions prior to submitting bid. No extras shall be paid due to unanticipated conditions.

C. Contractor shall be responsible for all coring, patching and repair of all wall and floor systems as required due to new construction. Maintain all fire ratings of existing building elements.

D. For all existing fixtures, receptacles, wiring, equipment, etc. shown to be removed, the owner shall have the first right of refusal.

E. Contractor shall be responsible for removal of all electrical devices and wiring in all demolished walls, whether specifically indicated or not.

F. Where demolished devices are part of a circuit that is thru-wired, or has additional devices on the circuit that are to remain unchanged, the contractor is responsible for maintaining the integrity of the existing circuit. Any additional conduit, conductors, boxes, etc. needed to modify the existing circuit to maintain the integrity are the responsibility of the electrical contractor and shall be included in bid.

G. When a fixture, device or pieces of equipment is noted for removal along with associated wiring or associated wiring and conduit, contractor shall remove wiring and conduit back to nearest junction box so that no conduit or wiring is exposed in occupied area. Wiring shall be disconnected upstream of removed fixture, device or piece of equipment so that wiring termination cannot be accidentally energized.

1.7 INSTALLATION

A. All raceways and wiring shall be installed so that they are concealed from view unless otherwise noted. Exposed conduit shall be allowed at structural level in areas in which there is no ceiling installed. All conduit shall be routed perpendicular or parallel to building lines and structure.

B. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

C. Installation shall comply with NECA 1

D. Measure mounting heights indicated on plans to bottom of unit for suspended items and to center of unit for wall mounted items.

E. If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

F. Install all equipment to facilitate service, maintenance and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

G. Apply firestopping to penetrations of fire rated floor and wall assemblies for electrical installations to restore original fire resistance rating of assembly.

H. Contractor shall relocate all circuit breakers to balance electrical load between each panel phase.

PART 2 – PRODUCTS

2.1 HOUSEKEEPING PADS

A. All equipment shall be installed on concrete housekeeping pads. Pad shall extend beyond equipment perimeter 4” and shall elevate equipment off of finish floor 4”.

B. Contractor shall have option to provide prefabricated housekeeping pad or pour pad in place.

2.2 SLEEVES

A. Sleeves shall be constructed from the following materials at contractor’s option.

1. Galvanized steel round tubing, closed with welded longitudinal joint.

2. Schedule 40 Steel Pipe.

260519 – CONDUCTORS AND CABLES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Follow circuiting shown on drawings for lighting, power and equipment connections.

B. Shared neutrals and grounds are not allowed.

C. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

D. Route conductors in raceway continuous between outlets and junction boxes with no splices or taps pulled into conduits.

E. Terminate solid conductors at equipment terminal strips and other similar terminal points with insulated solderless terminal connectors. Terminate all stranded conductor terminal points with insulated solderless terminal connectors.

F. Neatly route tie and support conductors terminating at switchboards, motor control centers, panelboards, and audio-visual equipment with cable ties and clamps.

G. Use manufacturer approved pulling compound or lubricant where necessary. Do not exceed manufacturer's recommended maximum pulling tension and sidewall pressure values.

H. Use pulling means including fish tape, cable, rope and basked weave wire/cable grips that will not damage cable or raceway.

I. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

J. Identify and color code conductors and cables according to Division 26 "Identification for Electrical Systems."

K. Support Cables according to Division 26, "Hangers and Supports for Electrical Systems."

L. Tighten electrical connections and terminals according to manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B

M. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

N. Make fixture taps with self-stripping electrical tap connectors.

O. Install conductor at each outlet with at least 6" of slack.

P. Apply firestopping to electrical penetrations of fire rated floor and wall assemblies to restore original fire-resistance rating of assembly according.

Q. No conductors smaller than #12 AWG are allowed unless specifically noted on plans.

R. All circuits in patient care areas shall be equipped with redundant grounding patch in accordance with requirements of the National Electrical Code.

S. Conductor size shall be provided so that voltage drop in branch circuit does not exceed 3%. Conductor size shall be provided so that voltage drop in panel feeders does not exceed 2%. Combined voltage drop of branch circuit and panel feeders shall not exceed 5%. Conductor sizes shown on drawings represent the minimum conductor size. Increase size as required to comply with voltage drop requirements according to requirements of National Electrical Code.

T. In some cases, tick marks are omitted for clarity or in cases in which insufficient space is available to display on plans. If contractor cannot determine correct number of wires to be included in conduit, contact A/E for assistance.

1.2 CONDUCTOR APPLICATION

A. All conductors shall be installed in rigid raceway unless otherwise noted.

B. MC cable shall be allowed in the following cases.

1. Installation of new devices recessed in an existing wall.
2. Flexible equipment connection. Maximum MC cable length shall be 4’-0”
3. Flexible light fixture whip. Maximum MC cable length shall be 6’-0” Whip shall originate from junction box. MC cable shall not be installed in a fashion that connects fixtures directly to each other.

PART 2 – PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Conductors shall be Copper and shall comply with NEMA WC 70.

B. Conductors shall be rated for 600 volts at conductor temperatures not to exceed 105 degrees Celsius.

C. Conductors shall be UL listed.

D. Conductor insulation shall be THHN-THWN installed in raceway.

E. Conductors shall be solid for size #10 AWG and smaller and shall be stranded for #8 AWG and larger.

F. Multi-conductor cable shall comply with NEMA WC 70 for metal clad cable with ground wire.

G. In patient care areas, all metal clad cable shall be hospital grade and shall be equipped with separate ground.

H. Aluminum conductors complying with NEMA WC 70 may be used in lieu of copper conductors for panel feeders size #1/0 AWG and larger. Conductors substituted shall have the equivalent current carrying ampacity to copper conductors specified. Contractor shall adjust conductor size as required to account for additional voltage drop in aluminum conductors.

260533 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed Conduit: Rigid Steel Conduit.
2. Concealed Conduit Above Grade: EMT
3. Underground Conduit: RNC, Type EPC – 40 – PVC direct buried.
4. Connection to Vibrating Equipment (Including Transformers, and Hydraulic, Pneumatic, Electric Solenoid or Motor Driven Equipment): LFNC

B. Indoors:

1. Exposed, not subject to physical damage: EMT
2. Exposed, subject to physical damage: Rigid Steel Conduit
    a. Includes raceways in the following locations:
        i. Loading Dock
        ii. Corridors used for traffic of mechanized carts, forklifts and pallet handling units.
        iii. Mechanical Rooms
        iv. Bottom Feed panel board conduit entries.
3. Concealed in ceilings and interior walls and partitions: EMT
4. Connection to vibrating equipment (Including Transformers, and Hydraulic, Pneumatic, Electric Solenoid or Motor Driven Equipment):
    a. Dry locations: FMC
    b. Wet or Damp Locations: LFMC
5. Conduit for fire alarm wiring: EMT colored Red.

1.2 BOXES ENCLOSURES AND CABINETS APPLICATION

A. Electrical Service Outlets (including plug receptacles, lamp receptacles, lighting fixtures and switches): 4” code gauge Sheet Metal Outlet Box

B. Light Fixture Boxes: 4” code gauge sheet metal outlet box with 0.375” inch or larger fixture stud in each outlet box to receive lighting fixture. Select covers with proper opening for device installed in outlet box.

C. Surface Mounted Exterior Boxes: Cast Metal Outlet Box

D. Surface Mounted boxes installed above kitchen floor: Cast Metal Outlet Box

1.3 OUTLET BOX AND RACEWAY INSTALLATION REQUIREMENTS

A. Use of utility or handy boxes shall only be allowed when box is flush mounted in masonry wall with dead end conduit entry from end or back.

B. Locate outlet boxes generally from column centers and finished wall lines. Install ceiling outlet boxes at suspended ceiling elevations.

C. Provide bracing straps spanning studs for support of all junction boxes installed in new walls.

D. Accurately locate lighting fixtures and appliance outlet boxes mounted in concrete or in plaster finish on concrete. Install outlet boxes in forms to dimensions taken from benchmarks, columns walls or floors. Rough-in light fixtures and appliance outlet boxes to general locations before installation of walls and furring and reset to exact

dimensions as walls and furring are constructed. Set outlet boxes true to horizontal and vertical finish lines of building. If outlet is shown to be installed in or on a column, outlet shall be centered on column.

E. Install outlet boxes accessible. Provide outlet boxes above piping or ductwork with extension stems or offsets as required to clear piping and ductwork.

F. When light fixtures are shown above a mirror, center fixture above mirror and install fixture with 2" of clearance between bottom of fixture and top of mirror.

G. Install boxes to maintain all fire ratings. In accordance with requirements of building code, Include fire rated sealing assemblies, putty pads and offset boxes where back to back.

H. Provide coverplates for all unused data devices.

I. All conduit elbows shall be long radius type. E/C shall review with A/E any instance in which a short radius elbow is required for coordination with field installation conditions.

J. All raceways, cables and boxes shall be recessed unless otherwise noted. Where shown in existing walls, contractor shall remove and replace wall finishes as required for installation or shall fish flexible cabling into wall cavity.

K. Unless otherwise noted, conduit connected to exterior building disconnect switches, C/T cabinets, meters, distribution panels, transfer switches and other equipment shall not be routed vertically and exposed on exterior of building. Route all conduit on interior of building concealed in wall. Notify A/E if construction type does not facilitate concealed conduit installation for clarification of routing.

1.4 UNDERGROUND HANDHOLES AND BOXES INSTALLATION REQUIREMENTS

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 0.5" sieve to #4 sieve and compacted to same density as adjacent undisturbed earth.

C. In paved areas, set elevation so that cover surface will be flush with finished grade. Set covers of enclosures in other areas at 1" above finished grade.

D. Install handholes and boxes with bottom below the frost line.

E. Install removable hardware, including pulling eyes, cable stanchions, cable arms and insulators as required for installation and support of cables and conductors as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.

F. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used.

PART 2 – PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. EMT (Electrical Metallic Tubing): Comply with ANSI C80.3

B. Rigid Steel: Comply with ANSI C80.1

C. FMC (Flexible Metal Conduit): Conduit shall be Zinc Coated Steel or Aluminum.

D. Fittings for conduit including all types and flexible and liquid tight, EMT, and cable shall comply with NEMA FB 1 and shall be listed for type and size raceway with which used and for application and environment in which installed.

1. Provide Steel, set screw or compression type conduit fittings.

   a. Set Screw shall be allowed in dry and concealed locations.

   b. Compression type fittings shall be used in wet and exposed locations.

2. Conduit fittings for hazardous locations shall comply with UL 886.

2.2 NON-METALLIC CONDUIT AND TUBING

A. LFNC (Liquidtight Flexible Metal Conduit): Comply with UL 1660.

B. RNC (Rigid Non-Metallic Conduit): Comply with NEMA TC2. Conduit shall be type EPC-40-PVC, unless otherwise noted.

C. Fittings for RNC shall comply with NEMA TC 3 and shall match conduit or tubing type and size to which applied.

D. Fittings for LFNC shall comply with UL 514B.

2.3 METAL WIREWAYS AND GUTTERS

A. Wireways shall be constructed of sheet metal sized and shaped as indicated in NEMA 250. Wireways shall be bear NEMA rating for application and location in which they are used. Include couplings offsets, elbows, expansion joints, adapters, hold down straps, end caps and other fittings to match and mate with wireways as required for complete system. Wireway cover shall be hinged type. Finish shall be manufacturer's standard enamel finish.

B. Items may be fabricated locally to same specifications as manufacturer's specified. Provide locally fabricated items free of burrs, sharp edges, un-reamed holes, exposed screw points or bolts and finished with one coat of suitable enamel inside and out, prior to mounting.

C. Provide sectional covers to maximize ease of removal.

2.4 SURFACE RACEWAYS

A. Provide non-metallic type surface raceway with two-piece construction, manufactured of rigid PVC with texture and color selected by Architect.

2.5 BOXES, ENCLOSURES AND CABINETS

A. No sectional outlet boxes are allowed.

B. Raised Cover: Provide code gauge galvanized steel raised covers on outlet boxes installed in plaster finish. Set to plaster grounds with outside edge of cover flush with plaster finish.

C. Sheet Metal Outlet Boxes: Steel, sheet metal knockout outlet box, complying with NEMA OS 1. Provide required depth for service or device.

D. Cast Metal Outlet Boxes: comply with NEMA FB 1 provide cast type FS or FD box with device cover and gasket. Provide blank cover and gasket when used as a junction box. Provide required depth for service or device.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2. See application schedule for size.

F. Concealed Service Metal Floor Boxes for Concrete Floors: Steel, rectangular box with four compartment, shallow stamped construction. Maximum Box depth shall be 2.5" with conduit entry size up to 1.25". Provide device brackets as required to install devices shown on plans. Box shall be designed for feed through tunneling to adjacent compartments. Provide cover assembly with flanged cover for use in tile or carpeted installation. Cover shall be equipped with insert in lid to allow for carpet or tile cutouts to match finished floor. Provide black cover unless otherwise noted.

G. Concealed Service Metal Floor Boxes for Wood Framed Floors: Rectangular box with two compartment, shallow stamped steel construction. Maximum Box depth shall be 2.75" with conduit entry size up to 1.25". Provide device brackets as required to install devices shown on plans. Provide cover assembly with flanged cover for use in tile or carpeted installation. Cover shall be equipped with insert in lid to allow for carpet or tile cutouts to match finished floor. Provide black cover unless otherwise noted. Where devices shown on plan cannot be installed in single box, provide additional boxes as required to accept installation of specified devices.

H. Surface Service Floor Box for Slab on Grade Installation: Round box with PVC construction box shall be equipped with 1" and 1.5" entry hubs. Provide concrete cap, and universal cover. Provide device brackets and cover plate as required to install devices shown on plans. Cover plate shall be black unless otherwise noted.

I. Surface Service Floor Box for Concrete Installation in Elevated Slab: Round box with steel poke through construction. Box shall be fire rated and UL listed for use in 1-4 hour rated floors. Box shall be adjustable for concrete floor thickness between 2.25" and 7" floor thickness and shall be equipped with (2) 1" EMT conduit

entries minimum. Provide concrete cap, and universal cover. Provide device brackets and cover plate as required to install devices shown on plans. Cover plate shall be black unless otherwise noted.

J. Raised Platform Floor Boxes: Where boxes are shown in floor of raised platform, provide 9.75" x 6.5" recessed floor box with two double gang openings, insert brackets, and black dual door cover.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Polymer Concrete Handholes and Boxes with Polymer Concrete Cover: Boxes shall be flared wall construction molded of sand and aggregate, bound together with polymer resin and reinforced with steel or fiberglass or a combination of the two. Cover shall be rated for traffic application in location of box shown on plans. When box is shown on plans to receive electrical equipment, such as wiring devices, lighting contactors, time switches, etc., provide channel strut mounting brackets as required for installation of devices shown. Enclosure cover shall be embossed as follows:

1. Line voltage wiring or conduit: "Electric"

2. Communications wiring or conduit: "Communication"

260553 – IDENTIFICATION FOR ELECTRICAL AND EQUIPMENT AND WIRING

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

E. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

F. Non-metallic Color Coded Tape or Marker Tape: Secure tight to surface of conductor or cable with non-metallic tie wraps or adhesive, as specified, at a location with high visibility and accessibility; and, in all enclosures with exposed energized parts.

G. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.

H. Painted Identification: Prepare surface and apply paint according to Division 09 painting Sections.

1.2 ELECTRICAL EQUIPMENT IDENTIFICATION

A. Install engraved plastic laminate sign or plastic equipment marker on or near each major item of electrical equipment and each operational device as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:

1. Distribution Panelboards
2. Branch Panelboards
3. Disconnect Switches
4. Enclosed Circuit Breakers
5. Transformers
6. Meter Centers
7. Lighting Contactors
8. Motor Starters
9. Variable Frequency Drives
10. Motor Control Centers
11. Lighting Control Panels
12. Time Switches

B. Where lettering larger than 1” height is needed for proper identification because of distance from normal location of required identification, stenciled signs may be provided in lieu of engraved sign at contractor’s option.

C. Lettering shall be minimum 1/4” high where viewing distance is less than 2’-0”; 1/2” high for distances up to 6’-0” and proportionately larger for greater distances. Secondary lettering shall be 2/3 to 3/4 of size of the principal lettering.

1.3 WIRING IDENTIFICATION

A. Install wiring tape on each conductor in accordance with the following color scheme.

1. 120/208V or 120/240V Systems

a. Phase A: Black

b. Phase B: Red

c. Phase C: Blue (Where Applicable)

d. Neutral: White

e. Ground: Green

2. 480/277V Systems

a. Phase A: Brown

b. Phase B: Orange

c. Phase C: Yellow

d. Neutral: White (Except as provided in section 200.6 of NFPA 70)

e. Ground: Green

PART 2 – PRODUCTS

2.1 ENGRAVED LAMINATE SIGN

A. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thickness indicated, engraved with the engravers standard letter style of the sizes and wording indicated. Signs shall be black with white core except as otherwise noted and shall be punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

B. Thickness shall be 1/16” for units up to 20 square inches or 8” in length and 1/8” for larger units.

2.2 PAINTED IDENTIFICATION

A. Painting where allowed shall be performed using standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications. Minimum letter height shall be 1.25” high for ductwork and equipment and 0.75” high for access door signs and similar operational instructions.

B. Paint shall be exterior type, oil based, black paint.

2.3 CABLE IDENTIFICATION MATERIALS

A. Color Coded Tape: Self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1” to 2” wide, colored as noted above.

B. Marker tapes: Vinyl or vinyl cloth, self-adhesive, wraparound type with circuit identification legend machine printed by thermal transfer or equivalent process.

2.4 UNDERGROUND WARNING TAPE

A. Provide bright colored, red, continuous printed, polyethylene tape compounded for permanent direct burial service and alkali and acid resistant. Provide embedded continuous metallic strip or core. Printed legend shall indicate type of underground line.

260923 – LIGHTING CONTROL DEVICES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Install all devices plumb and level.

B. Contractor shall calibrate all sensors and time switches per owner requirements.

C. Contractor shall provide training for owner on programming and use of lighting control devices.

PART 2 – PRODUCTS

2.1 TIME SWITCHES

A. Provide units as shown in schedule.

1. Electronic time switches:

a. Electronic solid state unit with alphanumeric display complying with UL 917.

b. Astronomic time shall be available on all channels.

c. Unit shall be equipped with battery backup to maintain program upon loss of utility power.

2. Electromechanical Dial Switches:

a. Provide astronomic time dial.

b. Unit shall be equipped with wound spring reverse carryover mechanism to keep time during power failures.

2.2 PHOTOCELLS

A. Provide unit as shown in schedule.

B. Provide with solid state contacts rated to operate connected relay, contactor coils, or microprocessor input. Unit shall comply with UL 773A.

C. Light level monitoring range shall be from 1.5 fc to 10 fc with an adjustment for turn on and turn off between those levels.

D. Unit shall be equipped with 15 second time delay to prevent false operation.

E. Unit shall be suitable for installation indoors or outdoors depending on location shown on plans.

2.3 LIGHTING CONTACTORS

A. Provide unit as shown on schedule.

B. Listing shall be consistent with type of load served.

C. Fault current withstand rating shall be equal to or greater than the available fault current at the point of installation.

D. Enclosure shall comply with NEMA 250.

E. Provide with control and pilot devices as scheduled.

F. Where control points are called for in control drawings and specifications, provide hardware interface to enable the BAS to monitor and control lighting contactors.

262416 – PANELBOARDS

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Do not interrupt electric service to facilities occupied by owner or others unless coordinated with owner and architect.

B. Install panelboards and accessories according to NEMA PB 1.1

C. Mount top of trim 90” above finished floor unless otherwise noted.

D. Mount panel board cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install all overcurrent protective devices and controllers not already factory installed. Set field adjustable circuit breaker trip ranges.

F. Install filler plates in unused spaces.

G. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

H. Installation shall comply with NECA 1.

I. After substantial completion, but not more than 60 days after final acceptance, measure load balancing and make circuit changes.

1. Measure during period of normal system loading.

2. Coordinate scheduling of load balancing circuit changes with owner and perform changes outside normal occupancy/working schedule of the facility.

3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.

4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

J. Provide temporary heat to maintain temperature according to manufacturer’s written instructions.

1.2 BREAKER COORDINATION

A. All circuit breakers including load side branch breaker shall be selectively coordinated and rated for available fault current listed in panel schedule or calculated at feeder connection of panel. Series rating is not allowed.

B. All circuit breakers feeding equipment such as, transfer switches, HVAC equipment, owner installed process equipment, elevators or other building equipment shall be coordinated with requirements of equipment manufacturer to ensure proper coordination and fault protection.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures:

1. Enclosures shall be flush and surface type as shown on plans. Panels shall be rated for environmental conditions at installed locations.

2. Front shall be secured to box with concealed trim clamps. For surface mounted fronts, match box dimensions. For flush mounted fronts, overlap box.

3. Skirt for surface mounted panelboards shall be same gauge and finish as panelboard front with flanges for attachment to panelboard, wall and ceiling or floor.

4. Finishes:

a. Panels and Trim: Steel, factory finished with manufacturer's standard two coat, rust inhibitor primer and baked on finish.

b. Back boxes: Galvanized steel

c. Provide permanent fungicidal treatment for overcurrent protective devices and other components.

5. Inside panelboard provide directory card mounted in transparent card holder with typed circuit directory listing all circuit numbers and loads served.

B. Phase Neutral and Ground Buses:

1. Material Tin plated copper.

2. Equipment ground bus: Adequate for feeder and branch circuit equipment grounding conductors; bonded to box.

3. Isolated Ground Bus: Adequate for branch circuit isolated ground conductors; insulated from box.

4. Neutral bus: UL rated for nonlinear loads.

5. Rating: Bus structure shall be rated by heat tests conducted in accordance with UL 67. The use of conductor dimensions will not be accepted in lieu of actual heat tests.

C. Conductor Connectors:

1. Material: Tin Pated Copper.

2. Main and Neutral Lugs: Suitable for connection to Copper or Aluminum Conductors

3. Feed Through Lugs: Suitable for use with Copper or Aluminum conductors. Locate at opposite end of bus from incoming lugs or main device.

4. Subfeed Lugs: Suitable for use with aluminum or copper conductors. Locate at same end of bus as incoming lugs or main device.

D. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers when shown with one or more main service disconnecting means and overcurrent protective devices.

E. Future Devices: Provide mounting brackets, bus connections, filler plates and necessary appurtenances required for future installation of devices.

F. Panelboard Short-Circuit Rating: Panelboard shall be fully rated for available fault current listed on plans or as calculated based on actual field installed conditions.

G. All panelboards and load centers shall be keyed alike.

H. Include tools and miscellaneous items required for overcurrent protective device test, maintenance and operation.

2.2 DISTRIBUTION PANELBOARDS

A. Provide distribution and power panelboards as indicated in the panelboard schedule and where shown on plans. Panelboards shall be equipped with thermal – magnetic, molded case circuit breakers of frame and trip ratings as shown on the schedule. Panelboard shall conform to NEMA PB-1, UL 67 and UL 50

B. Mains shall be circuit breaker or main lug only as indicated on plans.

C. Doors shall be secured with latch and tumbler lock.

D. Panelboard assembly shall be dead front with panelboard front removed. Main lugs or main breakers shall have barriers on five sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the mains shall have barriers.

2.3 FUSIBLE PANELBOARD

A. Provide dead front panelboard with fusible switches and combination motor starters as indicated in schedule and where shown on plans. Panelboards shall conform to NEMA PB1-1957 and UL 67 for panelboards.

B. Main and branch fusible switches shall be horsepower rated, positive quick-make, quick-break type with external operating handle suitable for padlocking in 'off' position. Provide switches with cover interlock with defeater to prevent opening cover when switch is energized or closing switch with door open. Cover shall be suitable for padlocking. Fusible switch units shall be interchangeable without disturbing adjacent units, and shall be properly supported to prevent vibration and breakage during shipment. Switches shall be UL short circuit rated for at least 10,000 amperes. Fuse holder for 1 to 600 amperes shall be high pressure type for use with class R current limiting fuses.

C. Motor starters shall meet minimum requirements of safety switches and motor starters as defined in this specification division 26.

2.4 LIGHTING AND BRANCH CIRCUIT PANELBOARDS

A. Provide dead front panelboards as indicated in schedule with bolt-in or plug-on molded case circuit breakers. Panelboards shall comply with NEMA publication PB-1, UL67 and UL50.

B. Provide one spare 0.75" conduit for every three spares and/or blank spaces with a minimum of three spare conduits per panel. Terminate conduit above accessible ceiling unless indicated otherwise.

2.5 LOAD CENTERS

A. Provide dead front load centers as indicated in schedule and where shown on plans with bolt-in or plug-on molded case circuit breakers as listed in schedule. Load centers shall conform to UL standard 67 as type 1, class 2 and shall be UL listed.

B. Provide one spare 0.75" conduit for every three spares and/or blank spaces with a minimum of three spare conduits per panel. Terminate conduit above accessible ceiling unless indicated otherwise.

2.6 DISCONNECTION AND OVERCURRENT PROTECTIVE DEVICES

A. Circuit Breakers: Circuit breakers shall be rated for size and amperage indicated on plans. Breakers shall be standard construction. All circuit breakers shall be UL and CSA listed, IEC 157-1 rated, meet NEMA AB1 and federal specification W-C 375B/GEN when applicable. Molded case circuit breakers shall have over center toggle type mechanisms, providing quick make, quick break action. Breakers shall be calibrated for operation in an ambient temperature of 40°C. Each circuit breaker shall have trip indication by handle position and shall be trip free. Two and three pole breakers shall be common trip. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Circuit breaker frame sizes greater than 100 amperes shall have variable magnetic trip elements that are set by a single adjustment so that tripping characteristics are uniform in each pole. A push to trip button shall be provided on the cover for mechanically tripping the circuit breaker. The circuit breaker shall have reverse connection capability and be suitable for mounting and operating in any position. Unless otherwise indicated, branch circuit breakers rated for up to 100 amperes shall have 10,000 RMS short circuit amperes symmetrical interrupting capacity. Circuit breakers above 100 amperes shall have 42,000 RMS short circuit amperes capacity.

2.7 PANELBOARD SUPPRESSORS

A. Panelboard shall be equipped with Surge Protective Device (SPD) where indicated on plans. Contractor shall have option to install integral or external surge suppression device. When external surge suppression device is selected by contractor, contractor shall provide connecting circuit breaker, wiring and conduit required for installation of external device per manufacturer's recommendations. Contractor shall coordinate panel location to ensure SPD can be installed adjacent to panelboard with the shortest and straightest possible conduit run between SPD and panelboard.

B. Surge Protection Device: IEEE C62.41 compliant, solid state, parallel connected, non-modular type with sine wave tracking suppression and filtering modules, UL 1449, second edition, short circuit current rating matching or exceeding the panelboard short circuit rating. Equip with the following accessories:

1. Accessories:

a. LED indicator lights for power and protection status

b. Audible alarm with silencing switch to indicate when protection has failed

c. One set of dry contacts rated at 5A and 250 V AC for remote monitoring of protection status.

d. Fuses rated at 200-kA interrupting capacity

e. Integral disconnect switch.

f. Redundant suppression circuits.

g. Redundant replaceable modules.

h. Arrangement with wire connections to phase buses, neutral bus and ground bus.

i. Transient event counter set to totalize transient surges.

2. Peak single impulse surge current rating:

a. Distribution Panelboards: 120 kA per mode/240 kA per phase.

b. Branch Circuit Panelboards: 80 kA per mode/ 160 kA per phase.

3. Minimum single impulse current ratings, using 8 by 20 microsecond waveform described in IEEE C 62.41.2

a. Line to Neutral: 70,000

b. Line to Ground: 70,000

c. Neutral to Ground 50,000

4. Withstand Capabilities: 12,000 IEEE C62.41, Category C3 (10 kA), 8 by 20 microsecond surges with less than 5 percent change in clamping voltage.

5. Protection modes and UL 1449 SVR for grounded wye circuits with three phase four wire circuits shall be as follows:

a. 480Y/277:

i. Line to Neutral: 800V

ii. Line to Ground: 800V

iii. Neutral to Ground: 800V

b. 208Y/120:

i. Line to Neutral: 400V

ii. Line to Ground: 400V

iii. Neutral to Ground: 400V

c. 240/120:

i. Line to Neutral: 400V, 800 V from high leg.

ii. Line to Ground: 400V

iii. Neutral to Ground: 400V

6. Protection modes and UL 1449 SVR for 240/120-V, single phase, three wire circuits shall be as follows:

a. Line to Neutral: 400V

b. Line to Ground: 400V

c. Neutral to Ground: 400V

2.8 POWER METERS

A. Provide automatic power meters with web interface when connected to building LAN.

B. Update software to latest version at project completion. Install and program software upgrades that become available within two years from date of substantial completion.

C. General Requirements

1. Meters shall comply with UL 1244.
2. Enclosure shall be NEMA 250 type 1 minimum with hasp for padlocking or scaling.
3. Memory backup shall be self-contained to maintain memory throughout power outages of 72 hours minimum.
4. Sensors: Current sensing type with current or voltage output, selected for optimum range and accuracy for meters indicated for this application.
5. Current Transformer Cabinet: Listed or recommended by metering equipment manufacturer for use with sensors indicated.
6. Provide one digital KY pulse to a user – definable increment of energy measurement. Match signal to BAS input and arrange to convey the instantaneous, integrated, demand level measured by meter to provide data for processing and possible programmed demand control action by destination system.
7. Provide LCD display indicating accumulative kilowatt-hours and current kilowatt load. Retain accumulated kilowatt-hour in a non-volatile memory, until reset.
8. Provide software, a product of power meter manufacturer, suitable for calculation of utility cost allocation.

262726 – WIRING DEVICES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 INSTALLATION REQUIREMENTS

A. Comply with NECA 1, install devices at mounting heights as indicated on plans.

B. Install wiring devices after all wall preparation including painting is complete.

C. Do not strip insulation from conductors until just before they are spliced or terminated.

D. Strip insulation evenly around conductor using tools designed for that purpose.

E. Existing Conductors:

1. Cut back and pigtail or replace all damaged conductors.

2. Straighten conductors that remain and remove corrosion and foreign matter.

3. Pigtailing existing conductors is permitted provided the outlet box is large enough.

F. Replace all devices that have been in temporary use during construction of that show signs that they were installed before building finishing operations were complete.

G. Keep each wiring device in its package or otherwise protected before it is time to connect conductors.

H. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes allowing metal to metal contact.

I. Install hospital grade receptacles in patient care areas with the ground pin or neutral blade at the top.

J. Do not use oversized or extra deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

K. All light switches shown side by side shall be ganged together and mounted under single faceplate.

L. Contractor shall adjust all occupancy sensors, for time delay, sensitivity and occupancy/vacancy operation as directed by owner. Contractor shall include visit to site after occupancy of the building by owner to adjust sensors.

1.2 FIELD QUALITY CONTROL

A. In healthcare facilities prepare reports that comply with recommendations in NFPA 99.

B. Test straight blade convenience outlets in patient care areas for the retention force of the grounding blade according to NFPA 99. Retention force shall not be less than 4 oz.

PART 2 – PRODUCTS

2.1 COLOR

A. Receptacle and Switch color shall be white unless otherwise noted below or on plans.

B. Faceplates finish shall be stainless steel unless otherwise noted below or on plans.

C. Dedicated circuit receptacles shall be marked on the face of the device with a red delta symbol.

D. Isolated ground receptacles shall be orange.

E. Receptacles connected to emergency power system shall be red.

F. Where new devices are installed adjacent to existing devices to remain, new device and faceplate colors shall match existing.

2.2 RECEPTACLES

A. Receptacles shall be rated for voltage and amperage as shown on drawings. Unless otherwise noted, receptacles shall be rated for 125 V and 20 A. For devices rated other than 125 V and 20 A provide equivalent grade construction as devices listed below.

B. Wiring devices shall comply with NEMA WD1, NEMA WD6 for configuration noted and UL 498.

C. Basis of Design:

1. Convenience receptacles: Hubbell HBL 5351 (single), CR 5352 (duplex)
2. Receptacles in Children's areas: Tamper Resistant Hubbell HBL 8300SG (duplex)
3. USB Charger convenience receptacles: Hubbell USB20X2 (duplex)
4. Hospital-Grade, Convenience Receptacles: Hubbell HBL 8310 (single), HBL 8300H (duplex)
5. Isolated-Ground, Convenience Receptacles: Hubbell CR 5253IG (duplex)
6. Tamper Resistant Convenience Receptacles: Hubbell HBL 8300SG (duplex)
7. GFCI Convenience Receptacle: Hubbell GF 20 (duplex)
8. GFCI Hospital Grade Convenience Receptacle: Hubbell HGF 8300
9. Twist Lock Convenience Receptacles: Hubbell HBL 2310
10. Clock Hanger or TV: Hubbell HBL 5235
    a. Provide when receptacle is indicated for use for wall mounted TV or wall mounted clock.

2.3 SWITCHES

A. Switches shall be rated for 20 A, and 120/277 V.

B. Switches shall comply with NEMA W1 and UL 20.

C. Basis of Design:

1. Single Pole Switch: Hubbell CS 1221
2. Two Pole: Hubbell CS 1222
3. Three Way: Hubbell CS 1223
4. Four Way: Hubbell CS 1224
5. Pilot Light Switch: Hubbell 1221 PL
6. Keyed Switch: Hubbell HBL 1221L
7. Single Pole, Double throw Momentary Contact: Hubbell HBL 1557
8. Keyed Single Pole, Double Throw Momentary Contact: Hubbell 1557L

2.4 WALL BOX DIMMERS

A. Dimmer switches shall be modular full wave, solid state units with integral quiet on-off switches with audible frequency and EMI/RFI suppression filters.

B. Control shall be continuously adjustable slider with single pole, or three way switching as required by circuiting shown on plans.

C. Incandescent Lamp Dimmers: Rated for 120/277 V, control shall follow square law dimming curve. On off positions shall bypass dimmer module. Dimmers shall be rated for 2000W.

D. Fluorescent Lamp Dimmers: Rated for 120/277V, Modular, compatible with dimmer ballasts and trim potentiometer to adjust low end dimming. Dimmer ballast combination shall be capable of consistent dimming with low end not greater than 20 percent of full brightness.

E. LED Lamp Dimmers: Rated for 120/277V, Compatible with LED driver or self-ballasted lamp specified in light fixture schedule.

2.5 OCCUPANCY SENSORS

A. Line Voltage Wall Switch Sensor: Dual Technology type, 120/277 V adjustable time delay up to 20 minutes, 180 degree field of view, with a minimum coverage area of 1200 square feet. Sensor shall be equipped with off override controls. Sensor shall be adjustable between occupancy and vacancy sensing operation.

B. Line Voltage Ceiling Sensor: Dual Technology type, 120/277 V adjustable time delay up to 20 minutes, 360 degree field of view, with a minimum coverage area of 1000 square feet.

C. Line Voltage Wall Sensor for Elevated Mounting Heights: Dual Technology type, 120/277 V adjustable time delay up to 20 minutes, 110 degree field of view with a minimum coverage area of 1200 square feet.

D. Low Voltage Ceiling Sensor: Dual Technology type, voltage compatible with power pack, 360 degree field of view with a minimum coverage area of 1000 square feet.

E. Low Voltage Wall Sensor for Elevated Mounting Heights: Dual Technology type, voltage compatible with power pack, 110 degree field of view with a minimum coverage area of 1200 square feet.

F. Power Pack for Low Voltage Occupancy Sensors: Rated for 20 A and 120 V/277 V, adjustable time delay up to 20 minutes. When quantity of occupancy sensors shown in space to control single power pack exceeds maximum rating of power pack, contractor shall provide additional power pack to accommodate quantity of occupancy sensors specified.

2.6 PENDANT CORD CONNECTOR DEVICES

A. Provide matching locking type plug and receptacle body connector with NEMA WD6 configuration shown on plans. Construction grade shall be heavy duty.

B. Body shall be nylon with screw open cable gripping jaws and provision for attaching external cable grip.

C. External cable grip shall be woven wire mesh type constructed of high strength galvanized steel wire strand matched to cable diameter and with attachment provision to corresponding connector.

2.7 CORD AND PLUG SETS

A. Match voltage and current ratings and number of conductors to requirements of equipment being connected.

B. Cord shall be rubber insulated, stranded copper conductors with type SOW-A jacket with green insulated grounding conductor and equipment rating ampacity plus a minimum of 30 percent.

C. Plug shall be nylon body with internal cable clamping jaws. Match cord and receptacle type for required connection.

2.8 WALL PLATES

A. Plate securing screws shall be metal with head color to match plate finish.

B. Material shall be as indicated in Color Section above.

C. When wall plates are furnished by device manufacturer. Color and material shall comply with requirements of this specification.

D. Weatherproof Wall Plates:

1. Weatherproof wall plates shall be “while-in-use” type.

2. Wall plates shall be expandable with 1” protrusion from wall while in collapsed position and 3.5” protrusion when expanded.

3. Wet location, Weatherproof while in-use cover plates shall comply with NEMA 250, type 3R requirements for weatherproof while in-use.

4. Wall plate shall be UL listed and compliant with NEC 406

2.9 MULTIOUTLET ASSEMBLIES

A. Products shall be from a single manufacturer designed for use as a complete matching assembly of raceways and receptacles.

B. Raceway material shall be as specified in section for conduit and raceways.

C. Wire shall be #12 AWG.

D. Provide devices as shown on plans.

265100 – LIGHT FIXTURES

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 GENERAL REQUIREMENTS

A. Provide fixtures complete with lamps and accessories required for hanging. Clean lamps, reflectors, lenses and fixture trims at time of final inspection. Mount recessed fixtures with trim flush to ceilings free of gaps or cracks.

B. Coordinate mounting of ceiling mounted light fixtures with other trades. Where additional ceiling or fixtures supports are required due to fixture location of weight they shall be provided by electrical contractor unless otherwise specified under ceiling specifications.

C. Provide 10 spare lamps for every 100 of each type and rating installed. Furnish at least one of each type.

D. For all light fixtures in food preparation areas, fixtures shall be provided with lensed covers or lamps that are coated and labeled as shatter resistant.

E. Coordinate ceiling types with architectural plans and provide recessed fixtures and mounting components as required for compatibility with ceiling type regardless of trim types specified on plans.

F. All light fixtures installed in fire rated ceiling shall comply with UL listing for rated assembly.

G. Fixture supports shall comply with NEC 410-15 and 410-16. Provide fixture securing clips as required.

H. All fluorescent and double ended lamp light fixtures shall be equipped with linear disconnecting means complying with NEC 410.73.

I. Contractor shall replace all lamps that are not operational or burn out within 30 days of substantial completion.

J. Dimming ballasts where required shall be two wire line voltage type compatible with wall box dimmer, or lighting control system as applicable. Provide all required wiring between ballast and wall switch regardless of number of wires indicated on plans.

K. Set fixtures plumb and square with ceilings and walls.

L. For fixtures installed in a grid ceiling, use a minimum of four ceiling support system rods or wires for each fixture. Locate fixtures not more than 6” from fixture corners.

M. For fixtures installed in grid ceiling of sizes less than ceiling grid, install fixtures as indicated on ceiling plan or center in ceiling tile and support fixtures independently with at least two metal channels spanning and secured to ceiling tees.

N. Adjust all aimable light fixtures per owner’s requirements.

O. Test all emergency light fixtures by interrupting power to ensure proper operation.

PART 2 – PRODUCTS

2.1 FIXTURES

A. See light fixture schedule on plans for fixture model number, mounting type, lamp type and equivalent manufacturers.

B. Fixture manufacturers shall be represented by factory authorized representative located in the state in which the project is to be constructed.

C. Fixtures shall be listed by UL or ETL for use in the United States. Fixtures that are tested to UL standards but not listed will not be accepted.

D. Door frames and other internal access shall be smooth operating free from light leakage under operating conditions and designed to permit relamping without the use of tools unless otherwise noted for vandal resistant operation. Doors frames and other internal devices shall be hinged.

E. All light fixtures with a painted surface exposed in occupied area shall be painted after fabrication.

F. All exposed fasteners in exterior location fixtures shall be captive type fasteners constructed with 316 Stainless Steel.

2.2 LAMPS

A. Provide lamp type as indicated in schedule. When information is not listed in schedule, comply with the following specifications.

B. Metal Halide: Comply with ANSI C78.1372 with a minimum of CRI 65 and color temperature of 4000K.

C. Fluorescent Lamps:

1. Lamps shall be low mercury type and shall comply with EPA's toxicity characteristic leaching procedure test, yielding less than 0.2 mg of mercury per liter when tested according to NEMA LL1.

2. T8 Rapid Start: Minimum CRI shall be 85 with color temperature of 3500K and minimum average rated life of 20,000 hours

3. T5 Rapid Start: Minimum CRI shall be 85 with color temperature of 3500K and a minimum average rated life of 20,000 hours

4. T5 High Output Rapid Start: Minimum CRI shall be 85 with color temperature of 4000K and a minimum average rated life of 20,000 hours.

5. Compact Fluorescent: Minimum CRI shall be 85 with color temperature of 3500K and a minimum average rated life of 10,000 hours at 3 hours operation per start. Lamps shall be suitable for use with dimming ballasts.

D. Incandescent Lamps: Provide base to match fixture with wattage as specified on drawings, or equal to maximum allowable fixture wattage.

E. Led system: Led modules integral to light fixtures shall be tested and rated in compliance with IESNA LM-79 and IESNA LM-80. Luminaires shall be rated for 50,000 hours lamp life. Color temperature and CRI shall be as noted in light fixture schedule. LED Modules and driver shall be capable of replacement without replacement of entire luminaire.

F. Medium Base LED: Fixture shall have manufacturer's advertised incandescent wattage equivalent equal to maximum wattage of light fixture. Color temperature and CRI shall be as noted in light fixture schedule.

2.3 DRIVERS

A. Integral Driver: Driver shall be equipped with lamp end-of-life detection and shutdown circuit, sound rating A, total harmonic distortion of less than 20%, transient voltage protection IEEE C62.41, category A or better, ballast factor of 0.95 or higher, power factor of 0.95 or higher.

B. Dimmer controlled light fixture drivers: Dimming range shall be 100 to 5 percent of rated lamp lumens. Driver input watts shall be capable of being reduced to 20 percent of normal. Driver shall be certified by manufacturer for use with specific dimming control system and lamp type indicated.

C. Emergency Power Unit: Where indicated on plans or required by design intent to meet code emergency lighting requirements, provide self-contained, modular, battery inverter unit, factory mounted or field mounted as required to operate lamps as described on schedule. Battery shall be sealed maintenance free nickel cadmium type. Charger shall be fully automatic, solid state, constant current type with sealed power transfer relay. Unit shall be equipped with factory or field installed electronic device to automatically initiate code required test of unit emergency operation at required intervals; test failure shall be annunciated by an integral flashing red LED.

280500 – COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 CODE SECTIONS

A. 2011 National Electrical Code, NFPA 70

B. 2012 International Building Code

C. 2012 International Plumbing Code

D. ADA – American Disabilities Act

E. ANSI – American National Standards Institute

F. ASTM – American Society of Testing Materials

G. NFPA – National Fire Protection Association

H. NEMA – National Electrical Manufactures Association

I. OSHA – Occupational Safety and Health Act

J. UL – Underwriter's Laboratories

K. All codes listed on architectural Code Reference Sheet or project cover sheet.

1.2 GENERAL

A. Provide all work in accordance with applicable codes, rules, ordinances, and regulations of local, State, and Federal Governments and other Authorities Having Jurisdiction (AHJ).

B. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the drawings and specifications or reasonably inferred; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system functioning as indicated by the design and the equipment specified. Elements of the work include materials, supervision, supplies, equipment, transportation, and utilities.

C. The drawings have been prepared diagrammatically intended to convey the scope of work, indicating the intended general arrangement of the equipment, fixtures, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The contractor shall use the drawings as a guide when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system. Plans shall not be scaled

D. Contractor shall coordinate with all other trades to ensure that all required project components are included in project bid.

E. If in any case the plans or specifications conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

F. If in any case the plans or specifications conflict with themselves, the most stringent of the conflicting information shall be the basis for bid. Contractor shall seek clarification of all conflicts prior to bid.

G. All change order requests shall be accompanied with itemized tabular breakdown of all materials and labor associated with installation of all associated materials for review of the design team. Lump sum pricing will not be accepted.

H. Contractor shall refer to each drawing and specification section in construction document set. No bids shall be submitted without review of all construction documents.

1.3 ALLOWABLE MANUFACTURERS

A. Allowable manufactures for all products listed in division 26 are listed in "Schedule of Manufacturers" on plans.

1.4 SUBMITTAL REQUIREMENTS

A. Submittals for products in division 26 shall include the following items.

1. Product data showing type, model and construction characteristics of product

2. Layout drawings for any systems requiring interconnection of various system components

3. All other documentation required to show compliance with the specifications.

B. Contractor shall allow a minimum of ten working days for design team of review of submittals.

1.5 WARRANTY REQUIREMENTS

A. Unless noted elsewhere in the specifications, all work shall be warrantied for a period of not less than one year from the date of substantial completion. The contractor shall provide work at no additional cost to correct any deficiencies in their work that were identified to have been present during the warrantied period.

1.6 DEMOLITION

A. Where demolition work is required contractor shall disconnect, demolish and remove wiring, systems, equipment and components indicated to be removed.

B. All equipment to be removed and reinstalled shall be disconnected, with services capped, cleaned and stored for reconnection.

C. Owner shall have first right of refusal for all materials being removed.

D. If equipment, wiring or systems to remain are damaged or unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

1.7 INSTALLATION

A. All equipment in division 28 shall be installed according to manufacturer's requirements and minimum code requirements. If in any case the plans or specifications are in conflict with either manufacturer's requirements or minimum code requirements the information on plans and specifications shall be superseded by manufacturers and code requirements.

B. No combustible materials shall be allowed in return air plenum regardless of indication on plans.

C. Installation shall comply with NECA 1

D. Measure mounting heights indicated on plans to bottom of unit for suspended items and to center of unit for wall mounted items.

E. If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

F. Install all equipment to facilitate service, maintenance and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

G. Apply firestopping to penetrations of fire rated floor and wall assemblies for electrical installations to restore original fire resistance rating of assembly.

PART 2 – PRODUCTS

2.1 HOUSEKEEPING PADS

A. All equipment shall be installed on concrete housekeeping pads. Pad shall extend beyond equipment perimeter 4" and shall elevate equipment off of finish floor 4".

B. Contractor shall have option to provide prefabricated housekeeping pad or pour pad in place.

2.2 SLEEVES

A. Sleeves shall be constructed from the following materials at contractor's option.

1. Galvanized steel round tubing, closed with welded longitudinal joint.
2. Schedule 40 Steel Pipe.

Section 28 41 00
Access Control and
Cameras

PART 1 GENERAL

1.0 SUMMARY

A. This section includes

Section 28 41 00 Access Control and Cameras

a. This section provides for access control devices, intrusion detection devices, security access devices, relay control, alarm monitoring controllers, credential creation and credential holder database and management and cameras.

B. Related Sections

a. Section 08 06 71 – Door Hardware Schedule
b. Section 08 71 00 –Door Hardware
c. Section 28 05 00 – Electronic Safety & Security

2.0 Definitions

A. AES: Advanced Encryption Standard
B. DHCP: Dynamic Host Configuration Protocol
C. DNS: Domain Name System
D. HSMS: Hosted Security Management System (SaaS PACS Application)
E. IEC: Independent Edge Controller
F. IP: Internet Protocol
G. ISO: International Standards Organization
H. LAN: Local Area Network
I. PACS: Physical Access Control System
J. PoE: Power over Ethernet
K. SaaS: Software as a Service
L. SDC: Security Door Controller
M. SIA: Security Industry Association
N. SSH: Secure Shell

O. SSL: Secure Sockets Layer
P. TLS: Transport Layer Security
Q. UI: User Interface
R. RPC: Remote Procedure Call
S. XML: Extensive Markup Language
T. API: Application Programming Interface
U. PII: Personally Identifiable Information
V. WAN: Wide Area Network

3.0 REFERENCES

A. Underwriters Laboratories, Inc. (UL) (www.ul.com)
   a. UL294 – Underwriters Laboratory Safety Standard 294 for Access Control System Units.

4.0 QUALITY ASSURANCE

A. Manufacturer shall be capable of providing field service representation during construction and approving application method.
B. Installer shall be capable of and provide assistance to the CM, Owner and Design Team on systems that area affected by the Access Control and Camera System.

5.0 WARRANTY

A. Installer Shall provide 2 year warranty including training, maintenance, service and monitoring.
B. The manufacturer shall warrant that the hardware product(s) are free from defect in materials and/or workmanship for a period of three (3) years from the date of shipment.

6.0 MAINTENANCE

A. The HSMS manufacturer shall provide periodic software upgrades.
   a. Updates will be available to the customer via the manufacturer's website.

7.0 SUPPORT

A. On-site support shall be provided by the subcontractor/installer.
B. Installing company shall provide evidence that it is an authorized dealer in good standing for the manufacturer of the HSMS, and that it meets the manufacturer's technical certification requirements.

8.0 SYSTEM DESCRIPTION

A. Application Functions
   a. The HSMS shall be a multi-tenant hosted application delivered via "Software as a Service" (SaaS) model. The HSMS system shall feature a centrally hosted "cloud" data center which is accessible to both on-premise equipment and system administrators via a variety of private and public networks.
   b. The HSMS application shall offer integrated access control, ID badging and

support for web-hosted and recorded video and integration with a variety of on-site video recording platforms.

c. The HSMS application shall offer immediate provisioning of new devices on demand by the end user.
d. All access control data shall be managed and maintained through a Web-based interface to a cloud baseddata center.
e. The system shall provide firmware installation capabilities to all connected Security Door Controller (SDC) panels.

B. System Architecture

a. The HSMS solution shall be delivered as a multi-tenant, Software as a Service platform supporting tens of thousands of remote access control points in single, geographically redundant multi-tenant application architecture. The HSMS service shall allow access from any standard browser by authenticated users with proper credentials.
b. The HSMS solution must have a demonstrated uptime in excess of 99.95% or greater over the past five years of service.
c. The HSMS must be internally redundant so that there is no single point of failure within the system.
d. The HSMS architecture must also contain a geographically remote Disaster Recovery facility with a full copy of all applications, synchronized databases, and the ability to take over data processing operations in the event of a system failure at the primary facility.
e. The HSMS application shall protect PII through the use of AES 256-bit encryption for all communications.
f. New features for the HSMS platform shall be released automatically on a quarterly basis at no incremental cost to customers.
g. Pricing shall conform to an on-demand model, with no up-front licensing expense.
h. Encryption & Authentication:
    i. Communications between Security Door Controller (SDC) panels and the HSMS shall be encrypted using AES 256-bit TLS 1.2+ encryption.
    ii. The HSMS shall validate the identity of any SDC panel attempting to communicate with it through the exchange of X.509 digital certificates.
i. Network Communications:
    i. The HSMS shall utilize Ethernet communications as its primary communications medium and shall conform to IEEE 802.3 industry standards for typical computer-based network connectivity:
        1. Ethernet connections shall use industry standard 8P8C modular connectors and shall conform to TIA/EIA-568-B wiring standards.
j. Security Door Controller (SDC):
    i. SDC's shall be expandable multi-panel units designed to be installed in a central location with readers wired back to the SDC.
    ii. SDCs multi-door controller hubs shall be fully expandable from 1 to 30 readers.
    iii. SDCs shall include a UL-listed chassis and power supply

designed to accommodate a variety of expansion options.

iv. SDCs shall include the ability to maintain a minimum of 250,000 cardholders based on the model.
v. The HSMS shall provide a seamless programming environment and shall fully integrate IECs and SDCs as integral components of the system.
vi. Communications options shall include:
1. 10/100Mbs Ethernet.
2. Wi-Fi.
3. CAN Bus - capable of using CAT5 or higher cable up to 1500 feet.

k. Independent Edge Controller (IEC):
i. IEC's shall be modular units designed to be installed near the reader location
ii. Each IEC shall have the ability to maintain a maximum of 250,000 cardholders based on the model and a minimum of 6,000 offline events.
iii. IECs shall include Power-over-Ethernet (PoE) capabilities, with the ability to supply up to 750mA of auxiliary power for external locks and/or REX devices and/or card readers.
iv. IEC PoE+ shall conform to the IEEE 802.3af standard.
v. Communications options shall include:
1. 10/100Mbs Ethernet.
2. Wi-Fi.

C. Schedules and Holidays
a. The HSMS shall provide the ability to define custom schedules for the purpose of managing facility access and operating auxiliary devices with the following options:
i. Create and edit a schedule. The HSMS shall permit up to 32 time periods per day.
ii. Associate a schedule with groups, floors, doors and/or devices.
iii. Temporarily override schedules until next schedule change, until a certain time or indefinitely as desired.
iv. Terminate a schedule's association with one or more groups, floors, doors or devices.
v. Delete a schedule.
vi. Create and edit a Holiday.
vii. Edit a Holiday's start and end date.
viii. Delete a Holiday.

D. Doors and Devices
a. Doors:
i. Each site may have one or more doors associated with it.
ii. Administrators shall be allowed permission to manage doors, including permission to create the door, edit its name and manage its security settings.
iii. Administrators shall be allowed to momentarily unlock a door from within the interface if the door is configured to be controlled from the browser.

b. Devices:
    i. Bulk Device Management via Device Profiles:
        1. The HSMS shall permit authorized administrators the ability to assign "profiles" such as schedules and permissions to doors, inputs, and credentials.
    ii. A device may have logical or physical inputs and outputs.
    iii. A logical input may be a schedule input to a timer.
    iv. A physical input is any physical input point on an SDC board.
    v. A site can have one or more devices associated with it.
    vi. Administrators shall be allowed permission to manage devices, including permission to create the device, edit its name and manage its security settings.

E. Credentials: Credential Database and Cards

a. Credential Database:
    i. The HSMS shall support multiple credentials per user.
    ii. The HSMS software interface shall maintain a database of all credentials associated with the account or sub-account, and the user to whom each is assigned.
    iii. Operations to be performed by the interface shall include, but not be limited to:
        1. Validate that card numbers are unique, numeric and value is appropriate for the credential in use.
        2. Support the creation of PIN credentials that are unique, 4 to 8 digits long, and either randomly generated by the system or selected by the user.
        3. Automatically send updated credential information to the appropriate access control panels with no other user intervention.
        4. Provide up to 64 customized fields per account for data storage pertaining to individual credential holders (users) registered in the system.
    iv. The HSMS shall support a variety of credential types including proximity cards, magnetic stripe cards, smart cards, and mobile credentials.
    v. The HSMS shall support a variety of Wiegand bit patterns.

b. Cards:
    i. May be assigned, revoked or deleted.
    ii. Authorized operators shall have the capability to see all cards associated with an account.
    iii. Sub-account administrators shall be capable of viewing only those cards assigned to users affiliated with their account.
    iv. Sub-account administrators shall have the ability to view currently unassigned cards.
    v. The HSMS software interface shall provide the capability to display the card format in addition to the name of the user to whom the card is currently assigned.
    vi. The ACS shall provide the capability to add cards using a local card reader.

vii. The HSMS shall provide the ability to support an unlimited number of standard and custom formats.

F. ID Badging
   a. The HSMS shall provide the necessary capabilities to allow authorized operators the ability to create fully customizable badge templates.
   b. The HSMS shall provide all necessary functionality to display images and print badges directly from the operator's screen.
   c. The HSMS shall provide for the support of two-sided badge printing.
   d. The HSMS shall provide the ability of bulk badge printing.

G. Antipassback
   a. Antipassback zones shall be constrained to a single SDC.
   b. Each SDC shall support two Antipassback zones, Ingress and Egress. Antipassback capabilities shall allow administrators the ability to enforce policies which control how individual users and groups of users are permitted to enter or exit physically controlled areas.
   c. Antipassback shall incorporate the following features:
      i. Hard Antipassback:
         1. Hard Antipassback shall prevent individual users from exiting or entering a zone if the system detects an incorrect current zone state.
      ii. Soft Antipassback:
         1. Soft Antipassback design shall allow administrators to specify controls for both individuals and groups.
         2. Antipassback Reset Interval:
            a. Soft Antipassback shall incorporate a Reset Interval providing the ability to determine a time period for Antipassback enforcement. Once the time period has elapsed, the system shall effectively reset the users' Antipassback status to allow re- entry into the same zone.
         3. Antipassback Reset Time:
            a. Soft Antipassback shall incorporate an Antipassback Reset Time parameter which shall reset a group's status as inside or outside the Antipassback zone at a specific time of day, and shall permit the ability to enter the time on a 24-hour clock with minute-by- minute detail.
      iii. All doors controlling access to a designated Antipassback Zone shall be configured for Antipassback.
      iv. Administrators shall not have the ability to delete a door once it has been configured for Antipassback.
      v. Users who enter through a door in a zone configured with Antipassback without presenting a credential shall not be authorized to exit when presenting a credential until the Antipassback Reset Interval has elapsed if enabled, or until their Antipassback status has been reset.
      vi. Users who exit a door without presenting a credential shall not be allowed to reenter until the Antipassback Reset Interval has elapsed if

enabled, or until their Antipassback status has been reset.

vii. Antipassback Immunity:
   1. Antipassback immunity shall permit users the ability to enter and exit Antipassback areas without restrictions. Immunity shall function as if Antipassback controls are not enabled.
   2. Antipassback immunity shall function on User Groups only.
   3. User Group configuration shall include a check box to enable Antipassback Immunity for the entire group.
   4. Groups that are immune to Antipassback controls do not follow the same Antipassback controls as groups that are not immune. These users are free to enter or exit a door even if the Antipassback Reset Interval has not elapsed.

H. Video Integration/Cameras
   a. The system shall be able to associate video camera clips with access events.The HSMS shall provide authorized administrators the ability to retrieve a video segment related to a specific event.
   b. The HSMS shall use the time stamp of the event and camera identifier to query the DVR for event clips.
   c. Video integration shall be available via online video recording incorporated within the HSMS Service as well as with third party video recording devices installed on the customer's premise.
   d. The HSMS shall provide email notifications for online video camera motion events, allowing designated recipients to get an email alert.

I. System Administrators
   a. Full tier-based Administrative Security Module:
      i. The HSMS shall permit multiple administrative tiers.
      ii. The HSMS shall provide multiple capabilities per tier.

J. Multi-Factor Authentication
   a. The HSMS shall be capable of multi-factor login authentication using the one of the following methods:
      i. Original Authentication Platform
         1. Login/password.
         2. Temporary token sent to administrators email valid for a limited time.
      ii. Upgraded Authentication Platform
         1. Login/password.
         2. Passcode redeemed from Google Authenticator.

K. Email and Text Message Notifications
   a. The HSMS shall have the ability to dispatch email and text message notifications to select administrators when one of the following predetermined events occur:
      i. Door Ajar/Door Ajar Cleared.
      ii. Door Forced Open.
      iii. Intrusion Alarm/Intrusion Alarm Cleared.
      iv. Too Many Invalid PINs.
      v. Unlock Schedule Restored/Door Locked by Keypad.

vi. Unlock Schedule Overridden by Keypad/Door Unlocked by Keypad.
vii. Door Locked by Timer.
viii. Door Unlocked by Timer.
ix. Failed Access by Unknown Person.
x. Failed access by Unknown User due to invalid credential type (card required).
xi. Failed Access by Known User.
xii. Low Battery.
xiii. Failed Access by a User within a Group.
xiv. Successful access by a user within a Group.
xv. Successful access by a specific user.
xvi. Device Engaged/Disengaged.
xvii. Unit Opened/Closed.
xviii. Control Panel/Control Board Unit Opened/Closed.
xix. AC Power Loss/Restoration.
xx. Control Panel Communication Failure.
xxi. Camera Connected.
xxii. Camera Disconnect.
xxiii. Camera Motion Event.

b. Account administrators shall have the ability to manage email or text message notifications according to functionality listed below:
   i. Create and edit notification rules specifying which administrator will receive email or text message notification of which system events.
   ii. Associate a schedule with each notification rule.
   iii. Specify the language to be used in notification emails.
   iv. Delete notification rules.

L. Activity Logs

a. The HSMS shall include an Activity Report tool that tracks all attempts to access the sites associated with an account, including both successful and failed attempts, with the following options:
   i. Display the Activity Report unfiltered, so that all activities are listed.
   ii. Display the Activity Report filtered by user, so that only those actions performed by a specific user are displayed.
   iii. Display the Activity Report filtered by site, so that only those actions performed at a specific site are listed.
   iv. Display the Activity Report filtered by door or device, so that only those actions performed on a specific door or device are listed.

b. Allow administrators to search the Activity Report for exception events, user events, control panel events and device events, searching by absolute date or relative days.

c. Allow administrators to search the Activity Report for events related to a specific door or device.

d. Allow administrators to search the Activity Report for actions performed by a specific user on a specific door.

M. Reports

a. User Report:
    i. The system, shall permit top level Administrators the ability to create customized reports of user properties, including:
        1. The date on which a user record was created or updated.
        2. Any custom field data maintained for one or more users.
b. Schedule Report:
    i. The system shall permit authorized administrators the ability to print Schedule configuration reports.
    ii. Schedule configuration reports shall include the following attributes:
        1. Schedule Name.
        2. Day of Week Name.
        3. Time of Day.
    iii. Schedule reports shall be grouped by schedule name.
    iv. Schedule reports shall be formatted to fit a standard letter 8.5" width paper.
    v. Print execution shall be performed through the Browsers Print function.
c. Scheduled Reports should allow either predefined or new reports to be run on a defined schedule.

N. Lockdown

a. The system shall permit authorized administrators the ability to create a collection of doors that are associated with an ACS6000, ACS300 and/or ACS100 to be locked down. Authorized administrators have the ability to initiate a lockdown via user interface and/or via the administrator mobile application.
b. The system shall permit the ability for a collection of doors to be locked down at the trigger of a device which is wired to the input of an ACS6000, ACS300, and/or ACS100 panel.

O. Licensing

a. No licensing shall be required for the HSMS system.

P. API Interface

a. The HSMS shall provide support for API integration with third party products providing capabilities such as:
    i. Automatically adding, modifying and deleting users from external sources.
    ii. Exporting user data and system events to 3rd party systems.

Q. Intrusion integration

a. The system shall allow administrators the ability to arm and disarm intrusion panels.
b. The system shall allow administrators the ability to run reports on intrusion events.

PART 2 PRODUCTS

1.0 Basis of Design Manufacturer:

A. Brivo Systems LLC.

a. 7700 Old Georgetown Road, Suite 300, Bethesda, MD 20814.
    i. Telephone: (301) 664-5242.
    ii. Fax: (301) 664-5264.
    i. Website: www.brivo.com.

2.0 APPROVED ALTERNATE PRODUCTS

A. Other Manufacturer's that meet the specification

3.0 System Components

A. Hosted Security Management System (HSMS)

a. Brivo Onair®

i. Multi-tenant SaaS Physical Access Control System (PACS).
ii. System requires no user-installed software.
iii. System requires no dedicated on-site PC hardware.
iv. System software requires no software maintenance.

B. Security Door Controllers (SDC)

a. Brivo ACS6000-E/ACS6008-E Door Control Panels:

i. Expandable modular design.
ii. Individually fused interface boards, locks, and REX devices.
iii. Both optical and physical door tamper switches.
iv. Power loss detection and automatic battery backup.
v. Compatible reader protocols include all Wiegand or HID formats up to 128 bits, iCLASS RS-232 and OSDP protocol over RS485 electrical interface.
vi. Authentication and encryption of X.509 Digital Certificates and AES 256-bit encryption using TLS 1.2+. Secure Communication Protocol (SCP) OSDP support for OSDP reader.
vii. OSDP support for two (2) readers per panel system.
viii. Support for two (2) wet outputs per panel system.
ix. Support for 2.4GHz Wi-Fi.
x. Support for Cellular Network Module with Verizon data plan.

C. Independent Edge Controller (IEC)

a. Brivo ACS300-E Door Controller

i. Built-in 802.3 Power over Ethernet(PoE+)
    1. 2 Wiegand ports with 350mA fuse each
    2. 1 RS485 port with 350mA fuse
    3. 2 Wet Relays with 350mA fuse each
    4. 12VDC at 350mA per door node
ii. Compatible reader protocols include all Wiegand or HID formats up to 128 bits, iCLASS RS-232 and OSDP protocol over RS485 electrical interface.
iii. Authentication and encryption of X.509 Digital Certificates and AES 256-bit encryption using TLS 1.2+. Secure Communication Protocol (SCP) OSDP support for OSDP reader.
iv. OSDP support for two (2) readers per panel system.
v. Support for two (2) wet outputs per panel system.
vi. Support for 2.4GHz Wi-Fi.
vii. Support for Cellular Network Module with Verizon data plan.

b. Brivo ACS100-E Door Controller

i. Built-in 802.3 Power over Ethernet(PoE+)
    1. Available output: switched ground that can be configured as Normally Open (Normal) or Normally Closed (Energized) for maglock applications up to 3A@24VDC (when using an external power supply to power the lock solenoid), or 12VDC signal for lock control.
    2. Output power for lock or external OSDP reader: 12VDC at 650mA output
ii. Authentication and encryption of X.509 Digital Certificates and AES 256-bit encryption using TLS 1.2+. Secure Communication Protocol (SCP) OSDP support for OSDP reader.
iii. One built-in OSDP reader per panel system.
    1. Additional support for one external OSDP reader per panel system.
iv. Supports a single lock output.

D. Ancillary Components

a. Card Readers – Wiegand Interface:
    i. HID
    ii. XceedID
    iii. Farpointe
b. Biometric Readers – Wiegand Interface:
    i. Suprema
c. Card Readers – RS-485 Interface/OSDP:
    i. HID
    ii. Allegion/Schlage
    iii. Brivo Smart Reader – Rev 1
    iv. Brivo Smart Reader – Rev 2
d. Rev 2 Brivo Smart Readers shall permit Fluid Access Mobile Credentials
    i. Brivo Mobile Pass
        1. Mobile app for smartphones (using iOS or Android) with following functionality:
            a. Managed directly from Brivo Onair application
            b. Remote assignment and revocation of mobile credentials
            c. Unlocks doors using Internet or Bluetooth connection
            d. Provides convenient multi-site access
            e. Optional two-factor authentication using built-in smartphone fingerprint or facial recognition
e. Mobile Application
    i. Application for smartphone or tablet (using iOS or Android) for easy access to Brivo Onair account functionality including the following:
        1. Administer Brivo Onair account from smartphone or tablet
        2. Viewing live video
        3. Monitoring activity logs across multiple sites
        4. Unlocking doors remotely
        5. Suspending and/or reinstating users
        6. Creation of new users and assigning of user credentials

7. Taking pictures of users for upload to Brivo Onair user profiles

f. Intrusion panels
   i. Alula BAT Connect
   ii. Alula Connect+

4.0 ACS6000-E/ACS6008-E Control Panel

A. Capacities

a. Supports up to 14 expansion boards for up to 30 readers per panel.
b. Support for up to 250,000 credential holders per panel (ACS6000-E/ACS6008-E).
c. Elevator control:
   i. 118 floors.
d. Inputs: 4:
   i. Maximum 120 using ACS6000-IO expansion modules.
   ii. Optional 4-state, dual end-of-line supervision.
e. Outputs: 4:
   i. Form C (SPST) 3A @24VDC.
   ii. Maximum 118 outputs using ACS6000-IO expansion modules.
f. Communications:
   i. Ethernet connection using port 443 outbound.
g. Authentication and encryption:
   i. X.509 Digital Certificates and AES 256-bit encryption using TLS 1.2+
   ii. OSDP supports Secure Communication Protocol (SCP)
h. Event history:
   i. 60,000 events (FIFO) offline from host. (ACS6000/ACS6008).
i. Expansion Boards:
   i. Maximum 14 per ACS6000-E/ACS6008-E.
j. Power consumption:
   i. 12VDC @ 500mA peak with all relays engaged (board only).
k. Communication bus wiring:
   i. CAN Bus: Use CAT5 (or higher) UTP cable up to 1,500 feet.
l. Temperature and humidity range:
   i. Operating Temp: 32° to 125° F, (0° to 49° C) Humidity: Max 85% non- condensing.
m. Control chassis dimensions:
   i. ACS6000-E: 17”h x 15.4”w x 3.5”d
   ii. ACS6008-E: 27”h x 15.4w x 3.5”d
n. Enclosure:
   i. NEMA type 1.
   ii. Physical tamper switch for ACS6000-E/ACS6008-E.
   iii. Optical tamper switch for ACS6000-E/ACS6008-E
   iv. Key locks
   v. Knockouts
o. Wi-Fi
   i. Supports 2.4GHz
p. Cellular

i. Cellular Network Module (USB) with Verizon data plan

q. Compliance:
   i. Access Control UL294 ULC Listed.
   ii. CE Certified.
   iii. FCC Part 15 Class B.

B. Expansion Modules

a. Brivo ACS6000-DB – Brivo ACS6000 Door expansion board:
   i. Wiegand reader ports (2).
   ii. Inputs points (4):
      1. Optional 4 state supervision.
   iii. Output relays (4):
      1. Form C (SPST) 3A @24VDC.
   iv. Power consumption:
      1. 12VDC @ 90mA idle / 400mA peak with all relays engaged.
   v. Communication bus wiring:
      1. CAN Bus: Use CAT5E (or higher) UTP cable up to 1500 feet.
   vi. Temperature and humidity range:
      1. Operating Temp: 32° to 125° F (0° to 49° C).
      2. Humidity: Max 85% non-condensing.
   vii. Compliance:
      1. UL294/ULC Listed.
      2. CE Certified.
   viii. Dimensions:
      1. 3.5”h x 11.5”w.

b. Brivo ACS6000-IO – Brivo ACS6000 Input/output expansion board:
   i. 8 - Inputs points:
      1. Optional 4 state supervision.
   ii. 8 - Output relays:
      1. Form C (SPST) relays 3A @24VDC.
   iii. Power consumption:
      1. 12VDC @ 90mA idle / 400mA peak with all relays engaged.
   iv. Communication bus wiring:
      1. CAN Bus: Use CAT5E (or higher) UTP cable up to 1500 feet.
   v. Temperature and humidity range:
      1. Operating Temp: 32° to 125° F, (0° to 49° C).
      2. Humidity: Max 85% non-condensing.
   vi. Compliance:
      1. UL294/ULC Listed.
      2. CE Certified.
      3. FCC Part 15 Class B.
   vii. Dimensions:
      1. 3.5”h x 11.5”w.

c. ACS6000-EXP – Small Expansion Enclosure:
   i. 2 – Expansion Board Capacity.

ii. Enclosure Dimensions:
1. 17”h x 15.4”w x 3.5”d

d. ACS6008-EXP – Large Expansion Enclosure:
i. 4 – Expansion Board Capacity.
ii. Enclosure Dimensions:
1. 27”h x 15.4”w x 3.5”d

5.0 Brivo independent edge controller

A. Brivo ACS300-E Door Controller

a. Mounting: 4” square electrical junction box
b. Dimensions: 7.5”h x 7.4”w x 1.5”d (187mm x 190mm x 40mm)
c. Compliance: Access Control UL294/ULC Listed, CE Certified, FCC Part 15 Class A Compliant, ROHS Compliant
d. Card format: Supports any card data format up to 128 bit
e. Cardholder memory: 250,000
f. Event history: 60,000 event history (FIFO) offline from host.
g. Power Supply Requirements: 2.5A @ 12VDC maximum
i. Recommended: Power is supplied using the Power over the Ethernet technology available with PoE+ (802.3) enabled network devices. Alternate: Supervised 12 VDC linear power supply relays can be configured to supply power as follow:
1. Available Power: The ACS300 is capable of supplying a total of 350mA, 12VDC each, on 3 ports to field devices. 2 door relay contacts can either be powered by the board, supplying 350mA, 12VDC or all 6 relays, unpowered are rated for 6 A @ 28VDC.
2. Use of a Listed Access Control / Burglary power-limited power supply is required for all listed installations.
h. Intended Use:
i. The ACS300 is intended for use in indoor environment that comply with the following specifications:
1. Operating Temperature: 32° to 125° F (0° to 49° C).
2. Operating Humidity: Max 85%, non-condensing.
i. Communication Ports:
i. Ethernet 10/100 Mbps.
1. USB to Ethernet

6.0 Hardware support	2. WIFI IEEE 802.11 b/g/n 3. Bluetooth 4.0

A. Brivo Cellular Network Module (CNM)
   a. The CNM shall provide Brivo control panels an alternative method for communicating to the internet in addition to ethernet or Wi-Fi.
   b. The CNM shall connect to the ACS6000 or ACS300 panels using the provided USB cable with the CNM to the USB port on the ACS6000 or ACS300 panels.
      i. The USB cable uses Micro-USB for the CNM interface and Type A USB for the control panel interface.
   c. When ethernet, Wi-Fi, and CNM options are all active, the CNM shall provide a third level of failover connectivity in cases where the control panel loses both ethernet and Wi-Fi connectivity.
   d. The CNM shall work in North America.
   e. The CNM shall utilize the Verizon cellular network.

B. Brivo Gateway
   a. External 12.5 watt, 110 V AC transformer that converts to 2.5A @ 5V DC
      i. Typical power consumption is approximately 5 watts
   b. The Brivo Gateway includes a cellular modem that shall work throughout the United States, Canada, and Mexico.
   c. The Brivo Gateway shall use three methods of connectivity – cellular, Ethernet, and Wi- Fi connectivity. Cellular is used as a fallback if Ethernet and/or Wi-Fi is not available or fails.
   d. Wi-Fi shall support 2.4GHz.
   e. Bluetooth LE version 5.1 shall be used for Gateway configuration through a mobile app that is compatible with Android and iOS.
   f. The Brivo Gateway utilizes Z-Wave protocols to shall connect to home automation devices such as locks, thermostats, and sensors.

C. Salto Sallis Wireless Locksets with IP Router
   a. The Salto node communicates the following data in series with the ACS6000/ACS300 panel to the HSMS:
      i. Open with card.
      ii. Open with metallic key.
      iii. Open with PPD (Portable Programming Device).
      iv. Open from Host.
      v. Door Forced.
      vi. Door Forced Cleared.
      vii. Door Ajar.
      viii. Door Ajar Cleared.
      ix. Communication has been established.
   b. Any combination of up to 30 card readers and Salto locks may be used per ACS6000-E, ACS6008-E, or ACS300-E panel.
   c. 1 router may be used per ACS6000/ACS300 panel mentioned in A.2.
   d. Up to 16 locks per node.
   e. Up to 7 nodes per router.

D. Allegion/Schlage NDE
   a. The Allegion/Schlage ENGAGE gateway communicates via RS485 transmission to the ACS6000 or ACS300 panels.Any combination of up to 30 card reader and

Schlage locks may be used per ACS6000-E, ACS6008-E, or ACS300-E panel.
b. Up to 10 locks per ENGAGE gateway.
c. Up to 4 gateways per ACS6000-E, ACS6008-E, OR ACS300-E

E. Allegion/Schlage LE
a. The Allegion/Schlage ENGAGE gateway communicates via RS485 transmission to the ACS6000 or ACS300 panels.
b. Any combination of up to 30 card reader and Schlage locks may be used per ACS6000-E, ACS6008-E, or ACS300-E panel.
c. Up to 10 locks per ENGAGE gateway.
d. Up to 4 gateways per ACS6000-E, ACS6008-E, OR ACS300-E

F. Allegion/Schlage AD400
a. The Allegion/Schlage Panel Interface Module communicates via Wiegand transmission to the ACS6000 or ACS300 panels.
b. Any combination of up to 30 card reader and Schlage locks may be used per ACS6000-E, ACS6008-E
c. Any combination of up to 2 card reader a Schlage locks may be used per ACS300-E panel.
d. Up to 2 locks per Panel Interface Module.

G. Allegion/Schlage Control Lock
a. The Allegion/Schlage Control Lock functions in an offline mode with no direct communication with the ACS6000 or ACS300 panels.
b. The lock is programmed using an Allegion MT20W and programmable credential.
c. Each programmable credential may support up to 11 groups with variable access permissions.
d. Each Allegion/Schlage Control Lock can be associated with 16 device groups.

H. ASSA ABLOY Aperio V3 Locksets with ASSA ABLOY AH40 Hub
a. The ASSA ABLOY Aperio V3 AH40 Hub communicates with the ACS300/ACS6000 via an ethernet (IP) connection via the Admin Port on the ACS300/ACS6000
b. The ASSA ABLOY Hub communicates the following data with the ACS300/ACS6000 panel to the HSMS:
i. Lock RF Communication Restored
ii. Lock RF Communication Failure
iii. Door Pulsed by Admin
iv. Door Ajar
v. Door Ajar Cleared
vi. Door Forced
vii. Opened by Key
viii. Lock Tamper
ix. Lock Tamper Cleared
x. Lock Low Battery
xi. Lock Battery Critical
xii. Unlock on Schedule
xiii. Lock on Schedule
c. Any combination of up to 30 card readers and ASSA ABLOY locks may be used per ACS6000-E, ACS6008-E, or ACS300-E panel.

d. Up to 30 Hubs may be connected per ACS300/ACS6000 panel
e. Up to 16 locks per Hub

f. 1 ACS300/ACS6000 panel allowed per network connection

I. Suprema Biometric Readers
a. The Suprema readers shall communicate via Wiegand transmission to an ACS control panel.
b. Any combination of up to 30 supported biometric readers may be used per ACS6000-E, or ACS6008-E panel
c. Any combination of up to 2 supported biometric readers may be user per ACS300-E.

J. Eagle Eye Bridge:
a. The Eagle Eye Bridge shall communicate directly to its Eagle Eye host
b. The Eagle Eye host shall communicate directly to the HSMS
c. The Bridge shall allow the ability for on-premise bandwidth management
d. The Bridge shall have the ability of various camera brand support

K. Intercom Integration
a. Access control administrators can configure one or more user groups to be downloaded to the touchscreen directory of an intercom.
b. The intercom directory list will automatically be updated as users are added or removed from the associated groups in the access control system.
c. Fields downloaded include display name, phone number and other configuration information to dial up to 3 distinct phone numbers per user in the intercom directory.
d. No inbound firewall ports shall be necessary for proper operation. The intercom shall initiate an outbound connection to the access control system on an hourly, daily or weekly time interval.

PART 3 EXECUTION

1.0 MANUFACTURER'S INSTRUCTIONS

A. Compliance
a. Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions and product carton installation instructions.

2.0 EXAMINATION

A. Site Verification of Conditions
a. Verify that substrate conditions, which have either been previously installed under other sections, or that existing site conditions, are acceptable for product installation in accordance with manufacturer's instructions.

b. Verify that building doors, frames, walls, wire runs, related items, and conditions are ready to receive work of this Section.

3.0 PROTECTION

A. Other Trades

a. Protect installed work of other trades and work of this section.

4.0 PREPARATION

A. Manufacturer Forms

a. Obtain and complete project planning forms from manufacturer of surveillance system; customize forms to be project specific.

B. Final Setup

a. Review, adjust, and prepare final documents to establish system software setup.

C. Record Setup Data

a. Electrical Preparation:
   i. Coordinate with trade where applicable.
b. Information Services:
   i. Coordinate with trade where applicable.
c. Fire Alarm:
   i. Coordinate with trade where applicable.

5.0 INSTALLATION

A. Installation

a. The installer shall show evidence of factory certification from the HACS manufacturer or manufacturer of the relevant system.
b. The installer shall install all system components and appurtenances in accordance with the manufacturer's specifications, referenced practices, guidelines and applicable codes. Furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise and surges from adversely affecting system operation.

B. Wiring

a. Conduit will be provided at locations only as shown on the drawings and this subcontractor/installer shall review in full the construction documents.
b. All low voltage wiring outside the control console, cabinets, boxes and similar enclosures, shall be plenum rated where required by code.
c. All wiring conductors connected to terminal strips shall be individually numbered and each cable or wiring group being extended from a panel or cabinet to a building mounted device shall be identified with the name and number of the particular device as identified and shown on building drawings.
d. All exposed wiring inside and outside the control console, cabinets, boxes and similar enclosures, shall be dressed down neatly and secured with wiring cleats or wire ties.

C. Containers
   a. All exposed metallic flexible conduit and armored cable shall be dressed down neatly and secured with low profile, metal fasteners.
   b. All cabinets, boxes, and similar enclosures containing security system components and/or cabling, which may easily be accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered to be accessible.
   c. All junction boxes and small device enclosures below ceiling level, and easily accessible to employees or the public, shall be covered with a suitable cover plate and secured with tamper proof screws.
   d. End-of-Line resistors shall be installed at the field device location and not at the controller panel location.

D. Drawings and Diagrams
   a. System devices identified on building drawings are intended to generally indicate areas where such devices are to be located. Installers shall be responsible for determining final location of these devices in accordance with Owner's requirements.

   b. Riser diagrams are schematic and do not show every conduit, wire box, fitting, or other accessories. Provide such materials as necessary for a complete and functioning.installation. Install in accordance with referenced codes and these specifications. Use weatherproof equipment or covers where installed in areas exposed to weather.

6.0 POST-INSTALLATION

A. Software updates to the HSMS application are to be delivered automatically without dealer intervention.

B. Firmware updates to SDCs are to be automated and shall not require physical access to the SDCs.

7.0 FIELD QUALITY CONTROL

A. Written Reports
   a. Subcontractor must note any variants at the site and notify owner's representative and CM within three business days of anything that might affect the delivery date of the system or any trades associated with the functioning of the system.

B. Manufacturer's Field Services
   a. When applicable, contractor is to coordinate a specific number of visits with the manufacturer's engineering support team for the system design, insulation, commissioning, final testing, or training.

8.0 TESTING & VERIFICATION

A. Perform tests recommended and required by manufacturer to verify required performance of the system.

B. The Installer is required to place entire system into full and proper operation as designed and specified.

C. Verify that all hardware components are properly installed, connected, communicating and operating correctly.
D. Verify that all system software is installed, configured, and complies with specified functional requirements.

9.0 COMPLETION & CLEANUP
A. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
B. The Installer shall perform final acceptance testing in the presence of Owner's representative, executing a point by point inspection against a documented test plan that demonstrates compliance with system requirements as designed and specified.
a. Submit documented test plan to CM/Owner at least (14) days in advance of acceptance test, inspection and check-off.
b. Conduct final acceptance tests in presence of Owner's representative, verifying that each device point and sequence is operating correctly and properly reporting back to control panel and control center.
C. Acceptance by CM/Owner/Architect is contingent on successful completion of check-off; if check-off is not completed due to additional work required, re-schedule and perform complete check-off until complete in one pass, unless portions of system can be verified as not adversely affected by additional work.
D. The system shall not be considered accepted until all acceptance test items have been successfully checked-off. Beneficial use of part or all of the system shall not be considered as acceptance.
a. The Installer shall provide system operations, administration, and maintenance training by factory trained personnel qualified to instruct in the following areas
i. Owner will designate personnel to be trained.
ii. Provide printed training materials for each trainee including product manuals, course outline, workbook or student guides, and written examinations for certification.
iii. Provide hands-on training with operational equipment.

ACCESS CONTROL
Web-based MANAGEMENT INTERFACE
PART 1 General
1.0 Summary
A. This section provides the specifications necessary for managing the entire Access Control System (ACS) over a Web-based Interface.
B. The interface shall be intuitive and shall follow industry standards for providing cross- platform compatibility with multiple Internet browser technologies such as: Internet Explorer, Mozilla Firefox, Google Chrome or Safari and shall not require a separate native application for any system configuration.

2.0 Definitions

A. HSMS – Hosted Security Management System
B. X.509 – ITU-T standard for a Public Key Infrastructure for Single Sign-On and Privilege Management Infrastructure
C. ITU-T – International Telecommunication Union, Telecommunications Standards Sector
D. SSL – Secure Sockets Layer
E. SDC – Security Door Controller
F. TLS – Transport Socket Layer

3.0 System Description

A. The HSMS Web-based Interface shall provide authorized operators the ability to manage the access control system over secured connections using any standard Web browser
B. Encryption & Authentication
   a. All sessions between the browser and the HSMS shall be encrypted using 256-bit Transport Socket Layer (TLS) encryption.
C. Browser requirements shall include, but not be limited to:
   a. The use of cookies must be enabled to preserve session information and allow the interface to function properly.
   b. JavaScript to validate form data, control navigation, and display images.
   c. The use of pop-up windows for functional elements.

4.0 Web-based Architecture

A. The HSMS Web-based Interface shall follow a structured layout allowing access to all major system categories:
   a. The main display shall consist of a home page that shall allow the user log-in access using a pre-determined user name and password.
   b. Access to all major categories of the system shall be through the use of a horizontal navigation bar.
   c. The navigation bar shall be accessible from all category and sub-category views.
   d. Upon login, the user shall be redirected to a Dashboard view, which shall provide dynamic activity lists and device status logs displaying the most recent events in reverse chronological order.
   e. All page views shall also include:
      i. An icon which shall link the user to Help supported topics.
      ii. An icon which shall permit the user to Logout of the system in a secure manner.

5.0 Other Programmable features

A. The Interface shall also include category views for the creation and management of:
   a. System activity logs and activity reporting.
   b. System devices and hardware.
   c. User cards, including editing, deleting and formatting.
   d. Users and user groups.
   e. Schedules and holidays.
   f. Account details, email notifications and the creation of custom fields.

g. Configuration and networking details of the ACS.

PART 2 Products

1.0 Manufacturers

A. Reference Section 28 13 00 – Access Control, Part 2,

CAMERAS

PART 1 General Information

1.1 Summary

A. Provide and Install similar camera type to those products that are included in the following pages. This Subcontractor is to provide a fully functioning system.

THIS SUBCONTRACTOR SHALL INSTALL ALL ACCESS CONTROL AND CAMERA SYSTEM AND COMPONENTS FOR A FULLY FUNCTIONING SYSTEM. A POST BID INTERVIEW WILL BE CONDUCTED TO CONFIRM THE SYSTEM BID. CABLING IS PROVIDED BY OWNER AND WILL BE INSTALLED TO THE LOCATION(S) SHOWN ON THE SPECIAL SYSTEMS PLAN. THIS SUBCONTRACTOR SHALL INSTALL THEIR PRODUCTS ONTO SUBSTRATES AS SHOWN AT IN THE CONTRACT DOCUMENTS AND IT IS THIS SUBCONTRACTORS RESPONSIBILITY TO PROVIDE AND INSTALL BACK BOXES/HANGERS/ETC. AS REQUIRED FOR INSTALLATION OF THEIR DEVICES PRIOR TO GYPSUM BOARD AND OTHER FINISHES BEING INSTALLED IF THEY ARE NECESSARY. NO BOXES WILL BE PROVIDED OR INSTALLED BY OTHER TRADES TO FACILITATE THIS SECTIONS INSTALLTION OF PRODUCTS OR DEVICES.

FLEXIDOME IP 3000i IR

- 1080p and 5MP resolutions
- Built-in Essential Video Analytics to trigger relevant alerts and quickly retrieve data
- Fully configurable H.265 multi-streaming
- Easy to install with zoom/focus lens
- Built-in IR illuminator with 30 m (98 ft) viewing distance

The FLEXIDOME IP 3000i IR is built for high quality, 24/7 performance, with a range of reliable surveillance features, including Essential Video Analytics, and is designed for easy installation.
The compact and minimalist design provides high installation flexibility and offers various mounting options.

Functions

Essential Video Analytics

The built-in video analysis reinforces the Intelligence-at-the-Edge concept and now delivers even more powerful features. Essential Video Analytics is ideal for use in controlled environments with limited detection ranges.
The system reliably detects, tracks, and analyzes objects, and alerts you when predefined alarms are triggered. A smart set of alarm rules makes complex tasks easy and reduces false alarms to a minimum. Metadata is attached to your video to add sense and structure. This enables you to quickly retrieve the relevant images from hours of stored video. Metadata can also be used to deliver irrefutable forensic evidence or to optimize business processes based on people counting or crowd density information.

High Dynamic Range

The high dynamic range mode is based on a multiple-exposure process that captures more details in the highlights and in the shadows even in the same scene. The result is that you can easily distinguish objects and features, for example, faces with bright backlight.

The actual dynamic range of the camera is measured using Opto-Electronic Conversion Function (OECF) analysis according to IEC 62676 Part 5.

Intelligent streaming

Smart encoding capabilities, together with Intelligent Dynamic Noise Reduction technology and analytics, reduce the bandwidth consumption to extremely low levels. Only relevant information in the scene, like motion, or objects found with the analytics, need to be encoded.
The camera is capable of triple streaming which allows the camera to deliver independent, configurable streams for live viewing, recording, or remote monitoring via constrained bandwidths.
Each of these streams can be adapted independently to deliver high quality video, perfectly tailored to purpose, while reducing bit rate by up to 90% compared to a standard camera.

H.265 high-efficiency video encoding

The camera is designed on the most efficient and powerful H.264 and H.265/HEVC encoding platform. The camera is capable of delivering high-quality and high-resolution video with very low network load. With a doubling of encoding efficiency, H.265 is the compression standard of choice for IP video surveillance systems.

Recording and storage management

Recording management can be controlled by the Bosch Video Recording Manager application, or the camera can use local storage and iSCSI targets directly without any recording software.

Local storage can be used for recording "at the edge" or for Automatic Network Replenishment (ANR) technology to improve the overall recording reliability. Pre-alarm recording in RAM reduces bandwidth consumption on the network and extends the effective life of the memory card.

Edge recording
Insert a memory card into the card slot to store up to 2 TB of local alarm recording. Pre-alarm recording in RAM reduces recording bandwidth on the network, and extends the effective life of the memory card.
It has advanced edge recording providing a reliable storage solution possible due to the combination of these functions:
- Industrial SD card support allows for extreme lifetime
- Health monitoring of industrial SD cards provide early service indications.

DORI coverage
DORI (Detect, Observe, Recognize, Identify) is a standard system (EN-62676-4) for defining the ability of a person viewing the video to distinguish persons or objects within a covered area. The maximum distance at which a camera/lens combination can meet these criteria is shown below:

1080p camera with 3.2 mm to 10 mm lens

DORI	DORI definition	Distance 3.2 mm/10 mm	Horizontal width
Detect	25 px/m (8 px/ft)	30 m/75 m (98 ft/246 ft)	77 m (253 ft)
Observe	63 px/m (19 px/ft)	12 m/30 m (39 ft/98 ft)	30 m (98 ft)
Recognize	125 px/m (38 px/ft)	6 m/15 m (20 ft/49 ft)	15 m (49 ft)
Identify	250 px/m (76 px/ft)	3 m/8 m (10 ft/25 ft)	8 m (25 ft)

5.3MP camera with 3.2 mm to 10 mm lens

DORI	DORI definition	Distance 3.2 mm/10 mm	Horizontal width
Detect	25 px/m (8 px/ft)	63 m/141 m (207 ft/463 ft)	123 m (404 ft)
Observe	63 px/m (19 px/ft)	25 m/56 m (82 ft/184 ft)	49 m (161 ft)
Recognize	125 px/m (38 px/ft)	13 m/28 m (43 ft/92 ft)	25 m (82 ft)
Identify	250 px/m (76 px/ft)	6 m/14 m (20 ft/46 ft)	12 m (39 ft)

Easy installation
Power for the camera can be supplied via a Power-over-Ethernet compliant network cable connection. With this configuration, only a single cable connection is required to view, power, and control the camera. Using PoE makes installation easier and more cost-effective, as cameras do not require a local power source.
The camera can also be supplied with power from +12 VDC power supplies.
For trouble-free network cabling, the camera supports Auto-MDIX which allows the use of straight or cross-over cables.

True day/night switching
The camera incorporates mechanical filter technology for vivid daytime color and exceptional night-time imaging while maintaining sharp focus under all lighting conditions.

Tamper and motion detection
A wide range of configuration options is available for alarms signaling camera tampering. A built-in algorithm for detecting movement in the video can also be used for alarm signaling.

Two-way audio and audio alarm
Two-way audio allows the operator to communicate with visitors or intruders via an external audio line input and output. Audio detection can be used to generate an alarm if needed.

Data security
Special measures have been put in place to ensure the highest level of security for device access and data transport. The three-level password protection with security recommendations allows users to customize device access. Web browser access can be protected using HTTPS and firmware updates can also be protected with authenticated secure uploads.
The on-board Trusted Platform Module (TPM) and Public Key Infrastructure (PKI) support, guarantee superior protection from malicious attacks. The 802.1x network authentication with EAP/TLS, supports TLS 1.2 with updated cipher suites including AES 256 encryption.
The advanced certificate handling offers:
- Self-signed unique certificates automatically created when required
- Client and server certificates for authentication
- Client certificates for proof of authenticity

- Certificates with encrypted private keys

System integration and ONVIF conformance
The camera conforms to the ONVIF Profile S, ONVIF Profile G and ONVIF Profile T specifications. For H.265 configuration, the camera supports Media Service 2, which is part of ONVIF Profile T. Compliance with these standards guarantees interoperability between network video products regardless of manufacturer. Third-party integrators can easily access the internal feature set of the camera for integration into large projects. Visit the Bosch Integration Partner Program (IPP) website (ipp.boschsecurity.com) for more information.

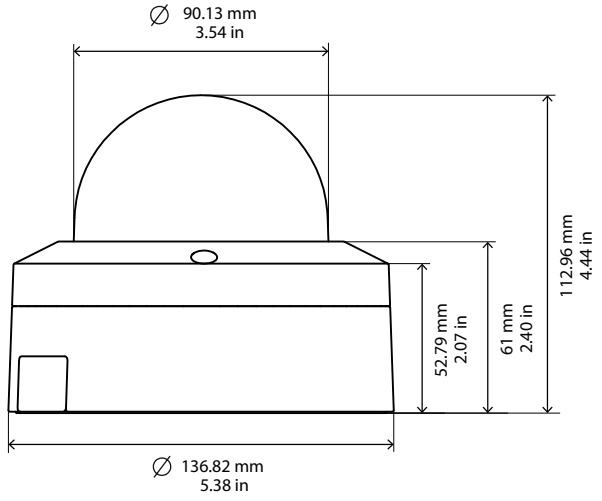
Universal accessories
A full line of universal accessories are available that allow a consistent design across different platforms and a wide range of installation possibilities. Several dedicated accessories are available that seamlessly fit to the camera and expand the different installation options over previous generations.

Certifications and approvals

Standard	Type
Emission	EN 55032 CFR 47 FCC part 15, Class B AS/NZS CISPR 32
Immunity	EN 50130-4 EN 50121-4
Environmental	EN 50130-5 (Class IV); EN 60068-2-1, EN 60068-2-2, EN 60068-2-6, EN 60068-2-18, EN 60068-2-27, EN 60068-2-30, EN 60068-2-52, EN 60068-2-75, EN 60068-2-78, EN 60068-2-5
Safety	EN 60950-1 EN 60950-22 UL 60950-1 UL 60950-22 IEC 62471 CAN/CSA-C22.2 No. 60950-1 CAN/CSA-C22.2 No. 60950-22-07
Image performance	IEC 62676-5
HD	SMPTE 296M-2001 (Resolution: 1280x720) SMPTE 274M-2008 (Resolution: 1920x1080)
Color representation	ITU-R BT.709-6
ONVIF conformance	EN 50132-5-2
	EN 62676-2
Impact protection	EN 62262 (IK10)
Water/dust protection	EN 60529 (IP66)
Environmental	EN 50581 (RoHS)
Marks	FCC, cULus, WEEE, RCM, VCCI, CMIM, EAC, KCC, BIS

Region	Regulatory compliance/quality marks	
Europe	CE	FLEXIDOME IP 3000i IR | FLEXIDOME IP micro 3000i | FLEXIDOME IP turret 3000i IR | DINION IP 3000i IR

Installation/configuration notes



Technical specifications

Power	
Input voltage	POE IEEE 802.3af / 802.3 at Type 1, Class 3 12 VDC ±30%
Power consumption (typical / maximum)	PoE: 3.5 W / 10.5 W 12 VDC: 3.1 W / 9.5 W

Sensor - 2 MP	
Sensor type	1/2.8 inch CMOS
Effective pixels	1920 (H) x 1080 (V)

Sensor - 5.3 MP	
Sensor type	1/2.9 inch CMOS

Sensor - 5.3 MP	
Effective pixels	3072 (H) x 1728 (V)

Video performance - Sensitivity	
2 MP	
Measured according to IEC 62676 Part 5 (1/30, F1.6)	
• Color	0.06 lx
• Mono	0.02 lx
• With IR	0.0 lx
5.3 MP	
Measured according to IEC 62676 Part 5 (1/30, F1.6)	
• Color	0.379 lx
• Mono	0.042 lx
• With IR	0.0 lx

Video performance - Dynamic range	
High Dynamic Range	120 dB WDR
Measured according to IEC 62676 Part 5	
2 MP	103 dB
5.3 MP	101 dB

Optical	
Lens type	3.2 to 10 mm, F1.6
Adjustment	Motorized zoom/focus
Iris control	DC iris control
Day/Night	Switchable IR-cut filter
Field of view	
2 MP	Wide: 104° x 54° (H x V) Tele: 33° x 19° (H x V)
5.3 MP	Wide: 89° x 47° (H x V) Tele: 30° x 17° (H x V)

Night vision	
Distance	30 m (98 ft)
LED	3 LEDs, 850 nm

Night vision	
IR intensity	Adjustable

Video streaming	
Video compression	H.265; H.264; M- JPEG
Sensor modes	
2 MP	30 fps, HDR, 1920 x 1080 25 fps, HDR, 1920 x 1080
5.3 MP	20 fps, HDR, 3072 x 1728 (5.3 MP) 25 fps, HDR, 2720 x 1530 (4.1 MP)
Streaming	Multiple configurable streams in H.264 or H.265 and M-JPEG, configurable frame rate and bandwidth. Regions of Interest (ROI)
GOP structure	IP
Encoding interval	
2 MP	1 to 30 fps
5.3 MP	1 to 20 fps (5.3 MP) 1 to 25 fps (4.1 MP)
Signal-to-noise ratio (SNR)	>55 dB

Video resolution	
2 MP	
1080p HD	1920 x 1080
720p HD	1280 x 720
SD	768 x 432
D1	720 x 480
VGA	640 x 480
5.3 MP	
5.3 MP	3072 x 1728
4.1 MP	2720 x 1530
3 MP	2304 x 1296
1080p	1920 x 1080
720p	1280 x 720
SD	768 x 432
D1	720 x 480

Video resolution	
VGA	640 x 480

Camera installation	
Mirror image	On / Off
Rotation	0° / 90° upright / 180° / 270° upright
Camera LED	Enable / Disable
Camera view wizard	Zoom, autofocus

Video functions - color	
Adjustable picture settings	Contrast, Saturation, Brightness
White Balance	2500 to 10000K, 4 automatic modes (Basic, Standard, Sodium lamp, Dominant color), Manual mode and Hold mode

Video functions - ALC	
Shutter	Automatic Electronic Shutter (AES); Fixed (1/25[30] to 1/15000) selectable; Default shutter
Day/Night	Auto (adjustable switch points), Color, Monochrome

Video functions - enhance	
Sharpness	Sharpness enhancement level selectable
Backlight compensation	On/off
Contrast enhancement	On/off
Noise reduction	Intelligent Dynamic Noise Reduction with separate temporal and spatial adjustments
Intelligent defog	Intelligent Defog automatically adjusts parameters for best picture in foggy or misty scenes (switchable)

Video content analysis	
Analysis type	Essential Video Analytics
Features	Rule based alarms and tracking, Line crossing, Enter / leave field, Follow route, Loitering, Idle / removed object, People counting, Crowd density estimation, 3D tracking

Additional functions	
Privacy Masking	Eight independent areas, fully programmable

Additional functions	
Display stamping	Name, Logo, Time; Alarm message
Pixel counter	Selectable area

Local storage	
Internal RAM	up to 5 s pre-alarm recording
Memory card slot	microSDHC / microSDXC SD card slot
Industrial SD cards	Extreme lifetime and health monitoring support that provides early service indication

Input/output	
Analog video out	CVBS: 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P) for installation
Audio line in	10 kOhm typical; max input 1 Vrms
Audio line out	16 Ohm typical; output 0.875 Vrms
Alarm input	Short or DC 5 V activation
Alarm output	Maximum load: 12 VDC / 50 mA
Ethernet	RJ45 connector

Audio streaming	
Standard	G.711, 8 kHz sampling rate L16, 16 kHz sampling rate AAC-LC, 48 kbps at 16 kHz sampling rate AAC-LC, 80 kbps at 16 kHz sampling rate
Signal-to-Noise Ratio	>50 dB
Audio Streaming	Full-duplex / half duplex

Network	
Protocols	IPv4, IPv6, UDP, TCP, HTTP, HTTPS, RTP/RTCP, IGMP V2/V3, ICMP, ICMPv6, RTSP, FTP, ARP, DHCP, APIPA (Auto-IP, link local address), NTP (SNTP), SNMP (V1, V3, MIB-II), 802.1x, DNS, DNSv6, DDNS (DynDNS.org, selfHOST.de, no-ip.com), SMTP, iSCSI, UPnP (SSDP), DiffServ (QoS), LLDP, SOAP, Dropbox™, CHAP, digest authentication
Encryption	TLS1.0/1.2, AES128, AES256
Ethernet	10/100 Base-T

Network	
Interoperability	ONVIF Profile S; ONVIF Profile G; ONVIF Profile T

Mechanical	
Dimensions (Ø x H)	137 x 113 mm (5.4 x 4.4 in.)
Weight (approx.)	760 g (1.68 lbs)
Mounting	Surface mount
Color	White (RAL9003)
3-axis adjustment (pan/tilt/rotation)	Pan: 0° to 355° Tilt: 0° to 85° Roll: 0° to 355°
Dome bubble	Polycarbonate, clear with anti-scratch coating

Environmental	
Operating temperature (continuous)	-30 °C to +50 °C (-22 °F to +122 °F)
Storage temperature	-30 °C to +70 °C (-22 °F to +158 °F)
Humidity	5% to 100% relative humidity (condensing) 5% to 93% relative humidity (non condensing)
Storage humidity	Up to 98% relative humidity
Impact resistance	IK10
Water/dust protection	IP66

Ordering information

NDE-3502-AL Fixed dome 2MP HDR 3.2-10mm IP66 IK10 IR
Fixed dome camera 2MP resolution; Essential Video Analytics; 3.2-10 mm lens; outdoor vandal resistant; integrated IR illuminator
Order number **NDE-3502-AL | F.01U.386.158 F.01U.360.360**

NDE-3502-AL-G Fixed dome 2MP 3.2-10mm IP66 IK10 IR 4S
Kit including NDE-3502-AL fixed dome camera and NDA-3080-4S adapter plate
Order number **NDE-3502-AL-G | F.01U.387.978**

NDE-3503-AL Fixed dome 5MP HDR 3.2-10mm IP66 IK10 IR
Fixed dome camera 5MP resolution; Essential Video Analytics; 3.2-10 mm lens; outdoor vandal resistant; integrated IR illuminator
Order number **NDE-3503-AL | F.01U.386.159 F.01U.360.359**

NDE-3502-AL-P Fixed dome 2MP HDR 3.2-10mm IP66 IK10 IR
Fixed dome camera 2MP resolution; Essential Video Analytics; 3.2-10 mm lens; outdoor vandal resistant; integrated IR illuminator
Order number **NDE-3502-AL-P | F.01U.396.876**

NDE-3503-AL-P Fixed dome 5MP HDR 3.2-10mm IP66 IK10 IR
Fixed dome camera 5MP resolution; Essential Video Analytics; 3.2-10 mm lens; outdoor vandal resistant; integrated IR illuminator
Order number **NDE-3503-AL-P | F.01U.396.877**

Accessories

NDA-3080-CND Conduit adapter 3000i outdoor camera M20
Conduit adapter for NDE-3000 outdoor camera
Order number **NDA-3080-CND | F.01U.396.506 F.01U.379.489**

NDA-3081-CND Conduit adapter 3000i outdoor camera M25
Conduit adapter for 3000i outdoor camera series
Order number **NDA-3081-CND | F.01U.396.508 F.01U.382.429**

NDA-3080-PIP Pendant interface plate NDE-3000
Pendant interface plate for NDE-3000 dome
Order number **NDA-3080-PIP | F.01U.396.505 F.01U.379.474**

NDA-3080-4S 4S adapter plate NDE-3000
4S adapter plate for NDE-3000 dome camera
Order number **NDA-3080-4S | F.01U.396.445 F.01U.379.488**

NDA-U-CMT Corner mount adapter
Corner mount adapter
Order number **NDA-U-CMT | F.01U.324.946**

NDA-U-PMAL Pole mount adapter large
Universal pole mount adapter, white; large
Order number **NDA-U-PMAL | F.01U.324.944**

NDA-U-PMAS Pole mount adapter small
Pole mount adapter small
Universal pole mount adapter, white; small.
Order number **NDA-U-PMAS | F.01U.324.943**

NDA-U-PMT Pendant pipe mount, 12" (31cm)
Universal pipe mount for dome cameras, 31 cm, white
Order number **NDA-U-PMT | F.01U.324.940**

NDA-U-PMTE Pendant pipe extension, 20" (50cm)
Extension for universal pipe mount, 50 cm, white
Order number **NDA-U-PMTE | F.01U.324.941**

NDA-U-WMP Wall mount plate
Back plate for universal wall mount, corner mount and pole mount, white, IP66
Order number **NDA-U-WMP | F.01U.324.950**

NDA-U-WMT Pendant wall mount
Universal wall mount for dome cameras, white
Order number **NDA-U-WMT | F.01U.324.939**

NDA-U-PMTG Pendant pipe mount, gang box
Universal pipe mount, compatible with gang box installation for fixed dome cameras only, white
Order number **NDA-U-PMTG | F.01U.358.359**

NDA-U-WMTG Pendant wall mount, gang box
Universal wall mount, compatible with gang box installation for fixed dome cameras only, white
Order number **NDA-U-WMTG | F.01U.358.358**

NDA-U-PSMB Pendant wall/ceiling mount SMB
Surface mount box (SMB) for wall mount or pipe mount.
Order number **NDA-U-PSMB | F.01U.324.942**

NPD-5001-POE Midspan, 15W, single port, AC in
Power-over-Ethernet midspan injector for use with PoE enabled cameras; 15.4 W, 1-port
Weight: 200 g (0.44 lb)
Order number **NPD-5001-POE | F.01U.305.288**

NPD-5004-POE Midspan, 4 port x 15W, AC in
Power-over-Ethernet midspan injector for use with PoE enabled cameras; 15.4 W, 4-ports
Weight: 620 g (1.4 lb)
Order number **NPD-5004-POE | F.01U.305.289**

UPA-1220-50 Power supply, 220VAC 50Hz, 12VDC 1A out
Power supply for camera. 110-240 VAC, 50/60 Hz In; 12 VDC, 1 A Out; regulated.
Input connector: 2-prong, European Europlug standard (4 mm / 19 mm).
Order number **UPA-1220-50 | F.01U.076.158**

UPA-1220-60 Power supply, 120VAC 60Hz,12VDC 1A out
Power supply for camera. 100-240 VAC, 50/60 Hz In; 12 VDC, 1 A Out; regulated.
Input connector: 2-prong, North American standard (non-polarized).
Order number **UPA-1220-60 | F.01U.076.155**

Services

EWE-3000IO -IW 12mths wrty ext 3000i series outdoor
12 months warranty extension
Order number **EWE-3000IO -IW | F.01U.382.247**

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www.boschsecurity.asia

DINION IP 3000i IR

- Fully configurable H.265 multi-streaming
- 1080p and 5MP resolutions
- Built-in Essential Video Analytics to trigger relevant alerts and quickly retrieve data
- Easy to install with zoom/focus lens
- Built-in IR illuminator with 30 m (98 ft) viewing distance

The DINION IP 3000i IR is built for high quality, 24/7 performance, with a range of reliable surveillance features, including Essential Video Analytics, and is designed for easy installation.
The compact and minimalist design provides high installation flexibility and offers various mounting options.

Functions

Essential Video Analytics

The built-in video analysis reinforces the Intelligence-at-the-Edge concept and now delivers even more powerful features. Essential Video Analytics is ideal for use in controlled environments with limited detection ranges.
The system reliably detects, tracks, and analyzes objects, and alerts you when predefined alarms are triggered. A smart set of alarm rules makes complex tasks easy and reduces false alarms to a minimum. Metadata is attached to your video to add sense and structure. This enables you to quickly retrieve the relevant images from hours of stored video. Metadata can also be used to deliver irrefutable forensic evidence or to optimize business processes based on people counting or crowd density information.

High Dynamic Range

The high dynamic range mode is based on a multiple-exposure process that captures more details in the highlights and in the shadows even in the same scene. The result is that you can easily distinguish objects and features, for example, faces with bright backlight.

The actual dynamic range of the camera is measured using Opto-Electronic Conversion Function (OECF) analysis according to IEC 62676 Part 5.

Intelligent streaming

Each of these streams can be adapted independently to deliver high quality video, perfectly tailored to purpose, while reducing bit rate by up to 90% compared to a standard camera.
Smart encoding capabilities, together with Intelligent Dynamic Noise Reduction technology and analytics, reduce the bandwidth consumption to extremely low levels. Only relevant information in the scene, like motion, or objects found with the analytics, need to be encoded.
The camera is capable of triple streaming which allows the camera to deliver independent, configurable streams for live viewing, recording, or remote monitoring via constrained bandwidths.

H.265 high-efficiency video encoding

The camera is designed on the most efficient and powerful H.264 and H.265/HEVC encoding platform. The camera is capable of delivering high-quality and high-resolution video with very low network load. With a doubling of encoding efficiency, H.265 is the compression standard of choice for IP video surveillance systems.

Recording and storage management

Recording management can be controlled by the Bosch Video Recording Manager application, or the camera can use local storage and iSCSI targets directly without any recording software.

Local storage can be used for recording "at the edge" or for Automatic Network Replenishment (ANR) technology to improve the overall recording reliability. Pre-alarm recording in RAM reduces bandwidth consumption on the network and extends the effective life of the memory card.

Edge recording
Insert a memory card into the card slot to store up to 2 TB of local alarm recording. Pre-alarm recording in RAM reduces recording bandwidth on the network, and extends the effective life of the memory card.
It has advanced edge recording providing a reliable storage solution possible due to the combination of these functions:

- Industrial SD card support allows for extreme lifetime
- Health monitoring of industrial SD cards provide early service indications.

DORI coverage
DORI (Detect, Observe, Recognize, Identify) is a standard system (EN-62676-4) for defining the ability of a person viewing the video to distinguish persons or objects within a covered area. The maximum distance at which a camera/lens combination can meet these criteria is shown below:

1080p camera with 3.2 mm to 10 mm lens

DORI	DORI definition	Distance 3.2 mm/10 mm	Horizontal width
Detect	25 px/m (8 px/ft)	30 m/75 m (98 ft/246 ft)	77 m (253 ft)
Observe	63 px/m (19 px/ft)	12 m/30 m (39 ft/98 ft)	30 m (98 ft)
Recognize	125 px/m (38 px/ft)	6 m/15 m (20 ft/49 ft)	15 m (49 ft)
Identify	250 px/m (76 px/ft)	3 m/8 m (10 ft/25 ft)	8 m (25 ft)

5.3MP camera with 3.2 mm to 10 mm lens

DORI	DORI definition	Distance 3.2 mm/10 mm	Horizontal width
Detect	25 px/m (8 px/ft)	63 m/141 m (207 ft/463 ft)	123 m (404 ft)
Observe	63 px/m (19 px/ft)	25 m/56 m (82 ft/184 ft)	49 m (161 ft)
Recognize	125 px/m (38 px/ft)	13 m/28 m (43 ft/92 ft)	25 m (82 ft)
Identify	250 px/m (76 px/ft)	6 m/14 m (20 ft/46 ft)	12 m (39 ft)

Easy installation
Power for the camera can be supplied via a Power-over-Ethernet compliant network cable connection. With this configuration, only a single cable connection is required to view, power, and control the camera. Using PoE makes installation easier and more cost-effective, as cameras do not require a local power source.
The camera can also be supplied with power from +12 VDC power supplies.
For trouble-free network cabling, the camera supports Auto-MDIX which allows the use of straight or cross-over cables.

True day/night switching
The camera incorporates mechanical filter technology for vivid daytime color and exceptional night-time imaging while maintaining sharp focus under all lighting conditions.

Tamper and motion detection
A wide range of configuration options is available for alarms signaling camera tampering. A built-in algorithm for detecting movement in the video can also be used for alarm signaling.

Two-way audio and audio alarm
Two-way audio allows the operator to communicate with visitors or intruders via an external audio line input and output. Audio detection can be used to generate an alarm if needed.

Data security
Special measures have been put in place to ensure the highest level of security for device access and data transport. The three-level password protection with security recommendations allows users to customize device access. Web browser access can be protected using HTTPS and firmware updates can also be protected with authenticated secure uploads.
The on-board Trusted Platform Module (TPM) and Public Key Infrastructure (PKI) support, guarantee superior protection from malicious attacks. The 802.1x network authentication with EAP/TLS, supports TLS 1.2 with updated cipher suites including AES 256 encryption.
The advanced certificate handling offers:

- Self-signed unique certificates automatically created when required
- Client and server certificates for authentication
- Client certificates for proof of authenticity

- Certificates with encrypted private keys

System integration and ONVIF conformance
The camera conforms to the ONVIF Profile S, ONVIF Profile G and ONVIF Profile T specifications. For H.265 configuration, the camera supports Media Service 2, which is part of ONVIF Profile T. Compliance with these standards guarantees interoperability between network video products regardless of manufacturer. Third-party integrators can easily access the internal feature set of the camera for integration into large projects. Visit the Bosch Integration Partner Program (IPP) website (ipp.boschsecurity.com) for more information.

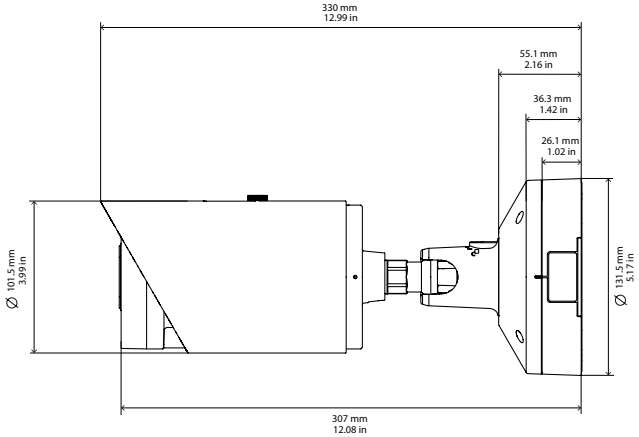
Certifications and approvals

Standard	Type
Emission	EN 55032 CFR 47 FCC part 15, Class B AS/NZS CISPR 32
Immunity	EN 50130-4 EN 50121-4
Environmental	EN 50130-5 (Class IV); EN 60068-2-1, EN 60068-2-2, EN 60068-2-6, EN 60068-2-18, EN 60068-2-27, EN 60068-2-30, EN 60068-2-52, EN 60068-2-75, EN 60068-2-78, EN 60068-2-5
Safety	EN 62368-1 EN 6095-22 UL 62368-1 UL 60950-22 IEC 62471 CAN/CSA-C22.2 No. 60950-1 CAN/CSA-C22.2 No. 60950-22-07
Image performance	IEC 62676-5
HD	SMPTE 296M-2001 (Resolution: 1280x720) SMPTE 274M-2008 (Resolution: 1920x1080)
Color representation	ITU-R BT.709-6
ONVIF conformance	EN 50132-5-2 EN 62676-2
Impact protection	EN 62262 (IK10)
Water/dust protection	EN 60529 (IP66)
Environmental	EN 50581 (RoHS)

Standard	Type
Marks	FCC, cULus, WEEE, RCM, VCCI, CMIM, EAC

Region	Regulatory compliance/quality marks	
Europe	CE	FLEXIDOME IP 3000i IR | FLEXIDOME IP micro 3000i | FLEXIDOME IP turret 3000i IR | DINION IP 3000i IR

Installation/configuration notes



Technical specifications

Power	
Input voltage	POE IEEE 802.3af / 802.3 at Type 1, Class 3 12 VDC ±30%
Power consumption (typical / maximum)	PoE: 3.5 W / 10.5 W 12 VDC: 3.1 W / 9.5 W

Sensor - 2 MP	
Sensor type	1/2.8 inch CMOS
Effective pixels	1920 (H) x 1080 (V)

Sensor - 5.3 MP	
Sensor type	1/2.9 inch CMOS
Effective pixels	3072 (H) x 1728 (V)

Video performance - Sensitivity	
2 MP Measured according to IEC 62676 Part 5 (1/30, F1.6)	
• Color	0.06 lx
• Mono	0.02 lx

Video performance - Sensitivity	
• With IR	0.0 lx
5.3 MP Measured according to IEC 62676 Part 5 (1/30, F1.6)	
• Color	0.379 lx
• Mono	0.042 lx
• With IR	0.0 lx

Video performance - Dynamic range	
High Dynamic Range	120 dB WDR
Measured according to IEC 62676 Part 5	
2 MP	103 dB
5.3 MP	101 dB

Optical	
Lens type	3.2 to 10 mm, F1.6 - 360
Adjustment	Motorized zoom/focus
Iris control	DC iris control
Day/Night	Switchable IR-cut filter
Field of view	
2 MP	Wide: 104° x 54° (H x V) Tele: 33° x 19° (H x V)
5.3 MP	Wide: 89° x 47° (H x V) Tele: 30° x 17° (H x V)

Night vision	
Distance	30 m (98 ft)
LED	2 LEDs, 850 nm
IR intensity	Adjustable

Video streaming	
Video compression	H.265; H.264; M- JPEG
Sensor modes	
2 MP	30 fps, HDR, 1920 x 1080 25 fps, HDR, 1920 x 1080
5.3 MP	20 fps, HDR, 3072 x 1728 (5.3 MP) 25 fps, HDR, 2720 x 1530 (4.1 MP)

Video streaming	
Streaming	Multiple configurable streams in H.264 or H.265 and M-JPEG, configurable frame rate and bandwidth. Regions of Interest (ROI)
GOP structure	IP
Encoding interval	
2 MP	1 to 30 fps
5.3 MP	1 to 20 fps (5.3 MP) 1 to 25 fps (4.1 MP)
Signal-to-noise ratio (SNR)	>55 dB

Video resolution	
2 MP	
1080p HD	1920 x 1080
720p HD	1280 x 720
SD	768 x 432
D1	720 x 480
VGA	640 x 480
5.3 MP	
5.3 MP	3072 x 1728
4.1 MP	2720 x 1530
3 MP	2304 x 1296
1080p	1920 x 1080
720p	1280 x 720
SD	768 x 432
D1	720 x 480
VGA	640 x 480

Camera installation	
Mirror image	On / Off
Rotation	0° / 90° upright / 180° / 270° upright
Camera LED	Enable / Disable

Camera installation	
Camera view wizard	Zoom, autofocus

Video functions - color	
Adjustable picture settings	Contrast, Saturation, Brightness
White Balance	2500 to 10000K, 4 automatic modes (Basic, Standard, Sodium lamp, Dominant color), Manual mode and Hold mode

Video functions - ALC	
Shutter	Automatic Electronic Shutter (AES); Fixed (1/25[30] to 1/15000) selectable; Default shutter
Day/Night	Auto (adjustable switch points), Color, Monochrome

Video functions - enhance	
Sharpness	Sharpness enhancement level selectable
Backlight compensation	On/off
Contrast enhancement	On/off
Noise reduction	Intelligent Dynamic Noise Reduction with separate temporal and spatial adjustments
Intelligent defog	Intelligent Defog automatically adjusts parameters for best picture in foggy or misty scenes (switchable)

Video content analysis	
Analysis type	Essential Video Analytics
Features	Rule based alarms and tracking, Line crossing, Enter / leave field, Follow route, Loitering, Idle / removed object, People counting, Crowd density estimation, 3D tracking

Additional functions	
Privacy Masking	Eight independent areas, fully programmable
Display stamping	Name, Logo, Time; Alarm message
Pixel counter	Selectable area

Local storage	
Internal RAM	up to 5 s pre-alarm recording
Memory card slot	microSDHC / microSDXC SD card slot

Local storage	
Industrial SD cards	Extreme lifetime and health monitoring support that provides early service indication

Input/output	
Analog video out	CVBS: 1.0 Vp-p / 75Ω composite, 720x480(N), 720x576(P) for installation
Audio line in	10 kOhm typical; max input 1 Vrms
Audio line out	16 Ohm typical; output 0.875 Vrms
Alarm input	Short or DC 5 V activation
Alarm output	Maximum load: 12 VDC / 50 mA
Ethernet	RJ45 connector

Audio streaming	
Standard	G.711, 8 kHz sampling rate L16, 16 kHz sampling rate AAC-LC, 48 kbps at 16 kHz sampling rate AAC-LC, 80 kbps at 16 kHz sampling rate
Signal-to-Noise Ratio	>50 dB
Audio Streaming	Full-duplex / half duplex

Network	
Protocols	IPv4, IPv6, UDP, TCP, HTTP, HTTPS, RTP/RTCP, IGMP V2/V3, ICMP, ICMPv6, RTSP, FTP, ARP, DHCP, APIPA (Auto-IP, link local address), NTP (SNTP), SNMP (V1, V3, MIB-II), 802.1x, DNS, DNSv6, DDNS (DynDNS.org, selfHOST.de, no-ip.com), SMTP, iSCSI, UPnP (SSDP), DiffServ (QoS), LLDP, SOAP, Dropbox™, CHAP, digest authentication
Encryption	TLS1.0/1.2, AES128, AES256
Ethernet	10/100 Base-T
Interoperability	ONVIF Profile S; ONVIF Profile G; ONVIF Profile T

Mechanical	
Dimensions (Ø x H)	101.5 x 307 mm (4 x 12.1 in.)
Weight (approx.)	1630 g (3.59 lbs)
Mounting	Surface mount

Mechanical	
Color	White (RAL9003)

Environmental	
Operating temperature (continuous)	-30 °C to +50 °C (-22 °F to +122 °F)
Storage temperature	-30 °C to +70 °C (-22 °F to +158 °F)
Humidity	5% to 100% relative humidity (condensing) 5% to 93% relative humidity (non condensing)
Storage humidity	Up to 98% relative humidity
Impact resistance	IK10
Water/dust protection	IP66

Ordering information

NBE-3502-AL Bullet 2MP HDR 3.2-10mm IP66 IK10 IR
Fixed bullet camera; 2MP HDR; Essential Video Analytics; 3.2-10 mm lens; IP66 and IK10 rated; integrated IR illuminator
Order number **NBE-3502-AL | F.01U.386.160 F.01U.360.358**

NBE-3503-AL Bullet 5MP HDR 3.2-10mm IP66 IK10 IR
Fixed bullet camera; 5MP HDR; Essential Video Analytics; 3.2-10 mm lens; IP66 and IK10 rated; integrated IR illuminator
Order number **NBE-3503-AL | F.01U.386.161 F.01U.360.357**

NBE-3502-AL-P Bullet 2MP HDR 3.2-10mm IP66 IK10 IR
Fixed bullet camera; 2MP HDR; Essential Video Analytics; 3.2-10 mm lens; IP66 and IK10 rated; integrated IR illuminator
Order number **NBE-3502-AL-P | F.01U.396.878**

NBE-3503-AL-P Bullet 5MP HDR 3.2-10mm IP66 IK10 IR
Fixed bullet camera; 5MP HDR; Essential Video Analytics; 3.2-10 mm lens; IP66 and IK10 rated; integrated IR illuminator
Order number **NBE-3503-AL-P | F.01U.396.879**

Accessories

NDA-3080-CND Conduit adapter 3000i outdoor camera M20
Conduit adapter for NDE-3000 outdoor camera
Order number **NDA-3080-CND | F.01U.396.506 F.01U.379.489**

NDA-3081-CND Conduit adapter 3000i outdoor camera M25
Conduit adapter for 3000i outdoor camera series
Order number **NDA-3081-CND | F.01U.396.508 F.01U.382.429**

NPD-5001-POE Midspan, 15W, single port, AC in
Power-over-Ethernet midspan injector for use with PoE enabled cameras; 15.4 W, 1-port
Weight: 200 g (0.44 lb)
Order number **NPD-5001-POE | F.01U.305.288**

NPD-5004-POE Midspan, 4 port x 15W, AC in
Power-over-Ethernet midspan injector for use with PoE enabled cameras; 15.4 W, 4-ports
Weight: 620 g (1.4 lb)
Order number **NPD-5004-POE | F.01U.305.289**

UPA-1220-50 Power supply, 220VAC 50Hz, 12VDC 1A out
Power supply for camera. 110-240 VAC, 50/60 Hz In; 12 VDC, 1 A Out; regulated.
Input connector: 2-prong, European Europlug standard (4 mm / 19 mm).
Order number **UPA-1220-50 | F.01U.076.158**

UPA-1220-60 Power supply, 120VAC 60Hz,12VDC 1A out
Power supply for camera. 100-240 VAC, 50/60 Hz In; 12 VDC, 1 A Out; regulated.
Input connector: 2-prong, North American standard (non-polarized).
Order number **UPA-1220-60 | F.01U.076.155**

NDA-U-PMAS Pole mount adapter small
Pole mount adapter small
Universal pole mount adapter, white; small.
Order number **NDA-U-PMAS | F.01U.324.943**

Services

EWE-3000IO -IW 12mths wrty ext 3000i series outdoor
12 months warranty extension
Order number **EWE-3000IO -IW | F.01U.382.247**

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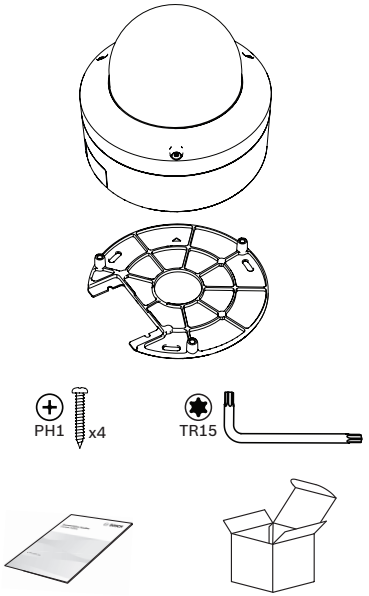

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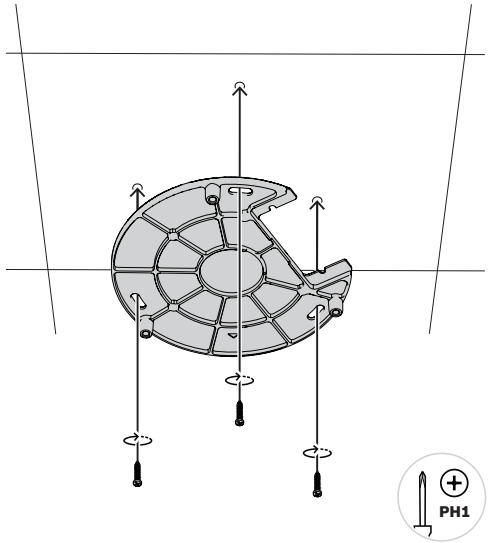

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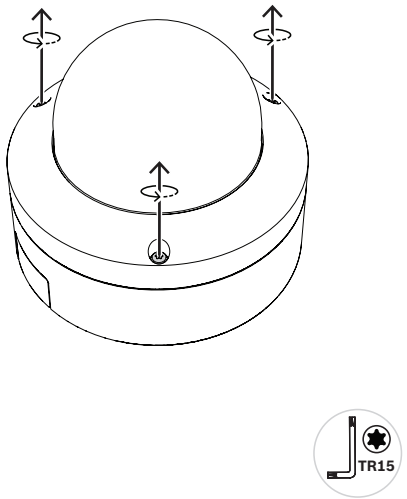

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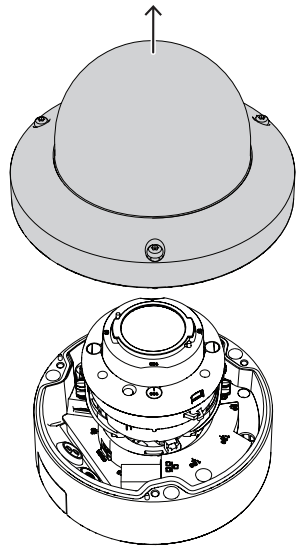

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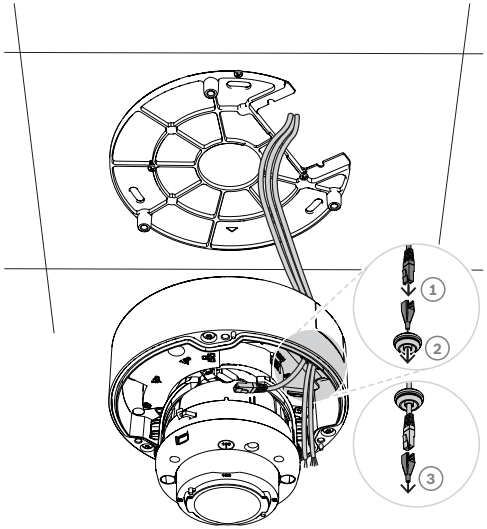

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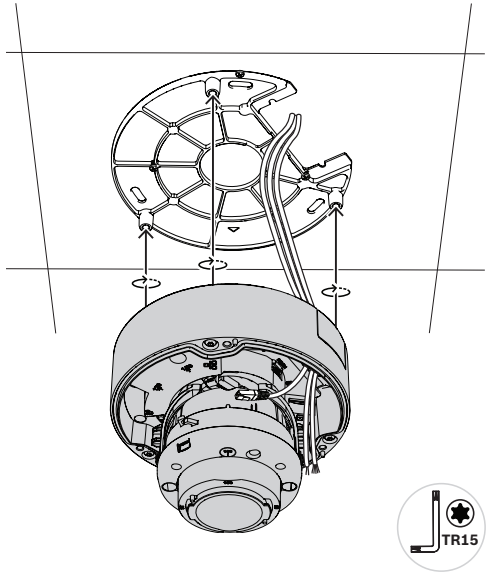

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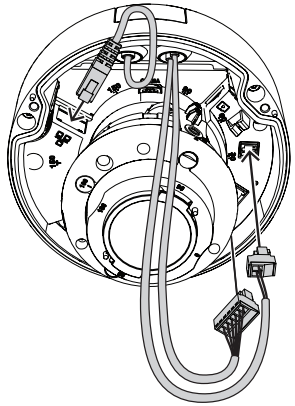

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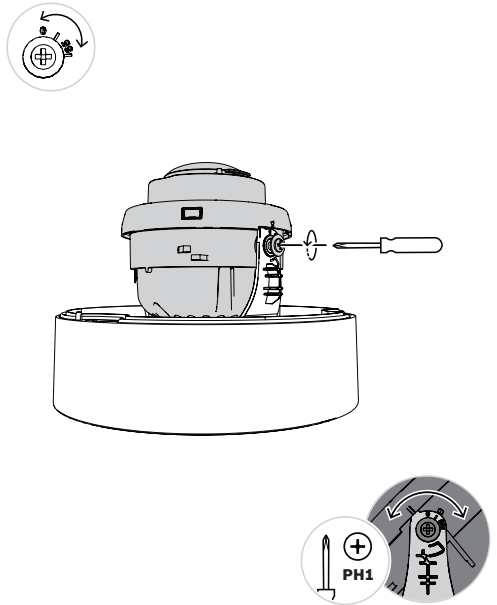

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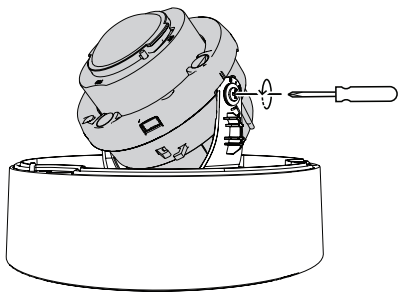

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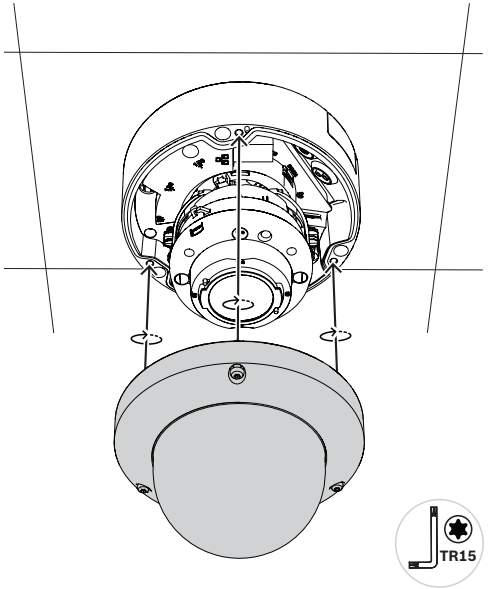

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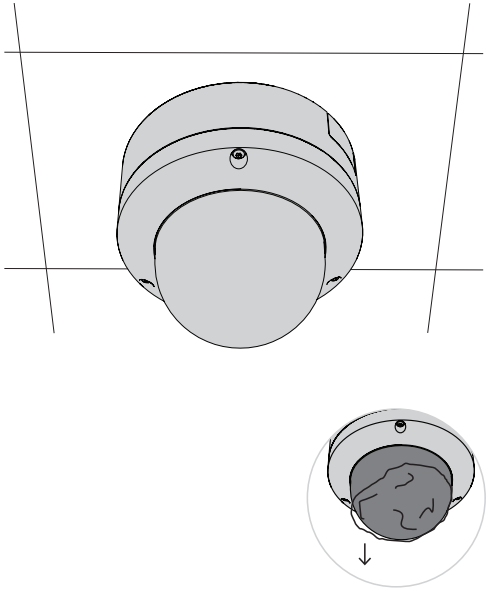

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BOSCH

FLEXIDOME IP 3000i IR

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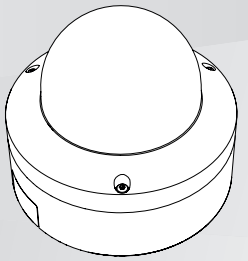

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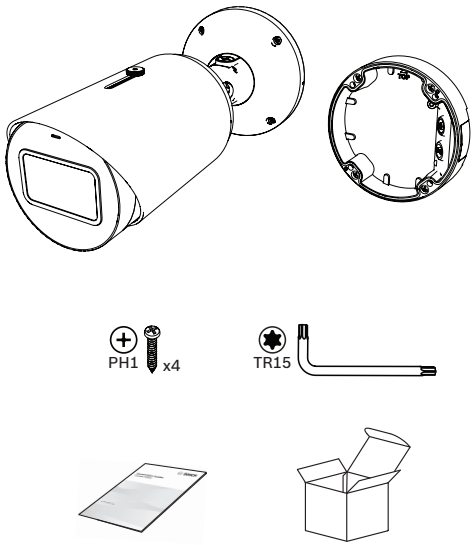

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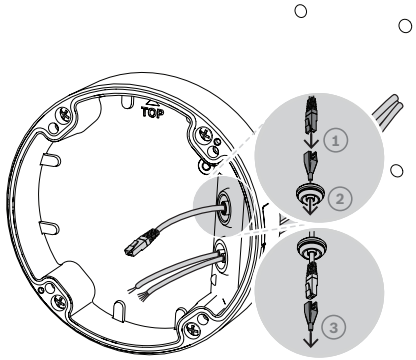

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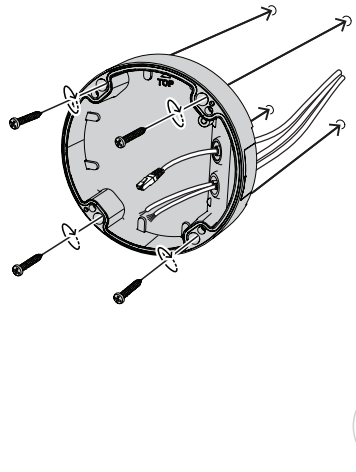

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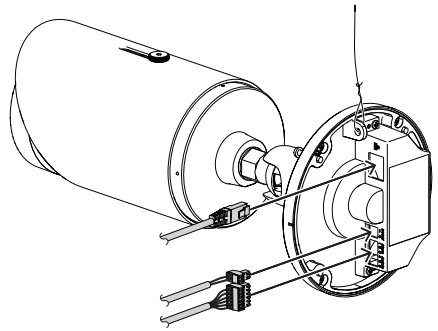

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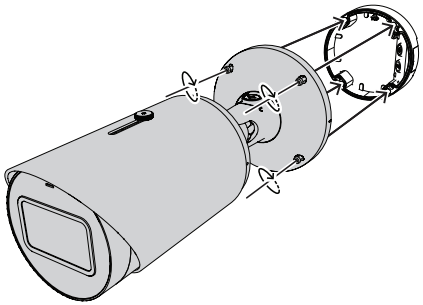

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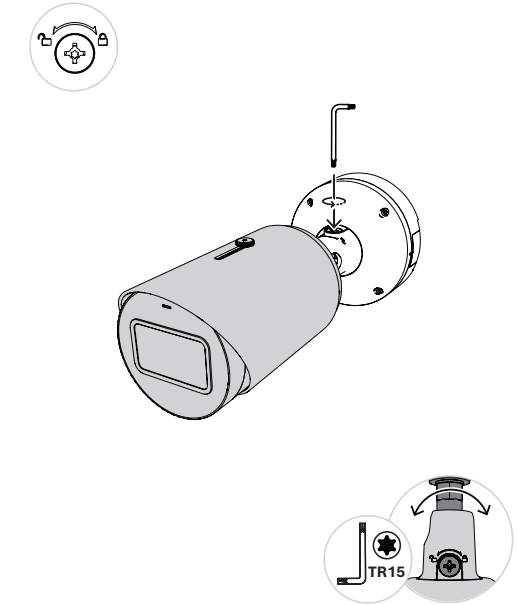

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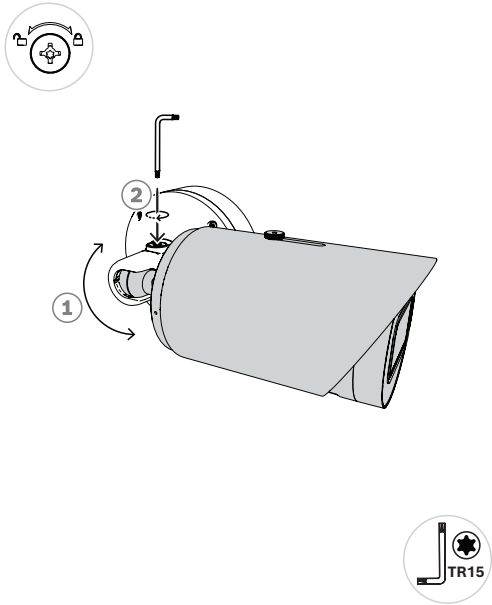

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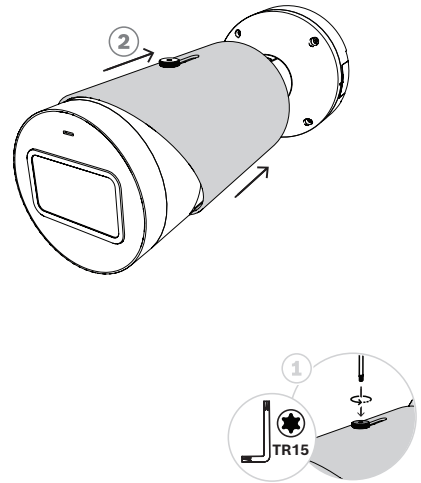

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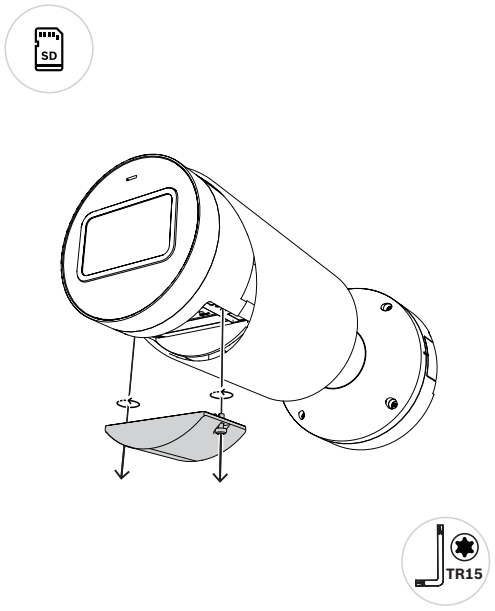

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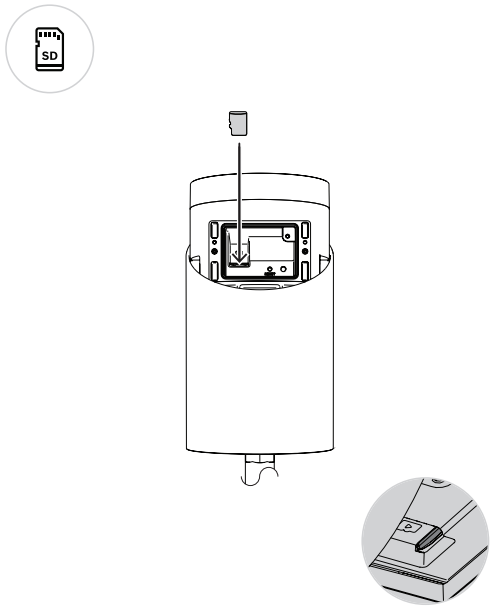

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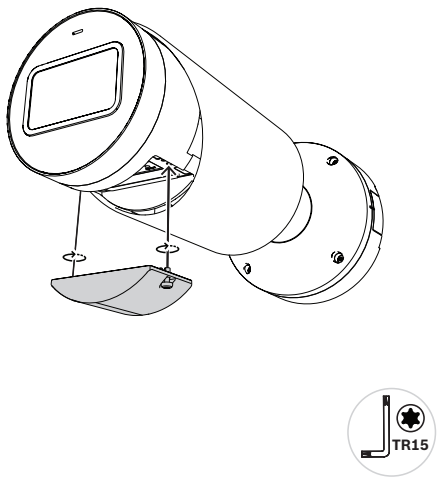

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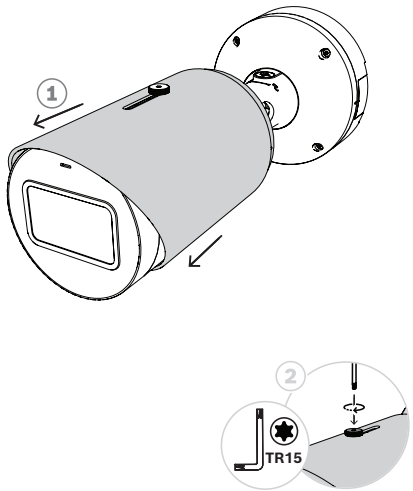

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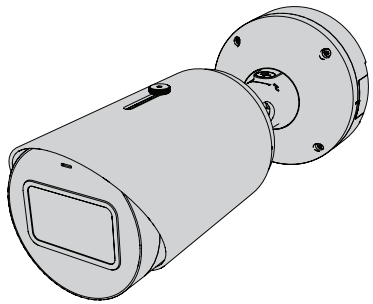

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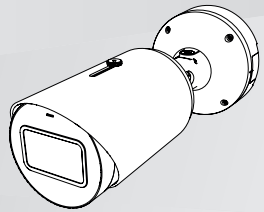

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End of Section 28 41 00

283111 – ADDRESSABLE FIRE ALARM SYSTEM

PART 1 – GENERAL REQUIREMENTS AND EXECUTION REQUIREMENTS

1.1 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864

B. Beginning with substantial completion, provide software support for a period of two years.

C. Update software to latest version at project completion. Install and program software updates that become available within one year from the date of substantial completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software. Provide 14 days notice to owner when updates are required to coordinate access to system and to allow owner to upgrade computer equipment if necessary.

1.2 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, minimum 1.

2. Keys and Tools: One extra set for access to locked and tamperproof components.

3. Fuses: Two of each type installed in system.

1.3 INSTALLATION REQUIREMENTS

A. System design and installation shall comply with NFPA 72. Fire alarm contractor is responsible to verify layout shown on plans with performance of proposed devices and revise as required for complete protection of building based on requirements of NFPA 72 and other applicable codes.

B. Fire alarm panel shall be flush type unless otherwise noted.

C. Connection to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections:

1. Connect new equipment to existing control panel in existing part of the building.

2. Connect new equipment to existing monitoring equipment at the supervising station.

3. Expand, modify and supplement existing equipment as necessary to extend existing functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

D. Smoke or Heat Detector Spacing:

1. Comply with NFPA 72.

2. Smooth ceiling spacing shall not exceed 30’.

3. Spacing of detectors for irregular areas, for irregular ceiling construction and for high ceiling areas shall be determined according to appendix A or appendix B in NFPA 72 as applicable.

4. Locate detectors not closer than 12” from any part of a light fixture.

5. Locate detectors not closer than 36” from and air supply diffuser or return air opening.

E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct.

F. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.

G. Remote Status and Alarm indicators: Install new each smoke detector and each sprinkler water flow switch and valve tamper switch that is not readily visible from normal viewing position.

H. Audible Alarm Indicating Devices: Install not less than 6” below the ceiling. Install bells and horns on flush mounted back boxes with device operating mechanism concealed behind a grille.

I. Visible Alarm Indicating Device: Install adjacent to each alarm bell or alarm horn and at least 6” below the ceiling.

J. Device Location Indicating Lights: Locate in public space near the device they monitor.

K. Fire alarm Panel: Recessed mounting with top of cabinet not more than 72” above finished floor. Coordinate location with casework in area of installation and report any conflicts to A/E prior to rough in.

L. Remote Annunciator: Install at 60” unless otherwise noted.

1.4 CONNECTION REQUIREMENTS

A. For fire protection systems related to doors in fire rated walls and partitions and to doors in smoke partitions, comply with requirements in door hardware specification. Connect hardware devices to fire alarm system. Verify that hardware and devices are NRTL listed for use with fire alarm system before making connection.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make and addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Alarm initiating connection to smoke control system (smoke management) at fire fighter smoke control panel.
2. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
3. Smoke dampers in air ducts of designated air-conditioning duct systems.
4. Alarm-initiating connection to elevator recall system and components.
5. Alarm-initiating connection to activate emergency lighting control.
6. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
7. Supervisory connections at valve supervisory switches.
8. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
9. Supervisory connections at elevator shunt trip breaker.
10. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
11. Supervisory connections at fire-pump engine control panel

1.5 SUBMITTAL

A. Contractor shall provide submittal with all calculations, wiring diagrams and indication of all code required system features. Submittal shall be provided to local Authorities for review and approval. All submittal documents shall be sent to their review and approval. Submit approved and stamped submittals from authority having jurisdiction as a new submittal on project website.

1.6 MONITORING

A. System shall be monitored at remote location in accordance with all code requirements and NFPA standards. All components required for building monitoring shall be provided in base bid. Contractor shall be responsible to ensure that panel is fully capable of communicating with owners monitoring vendor. Prior to rough in inspection, ensure that required cabling is in place or that conduit path is available to allow concealed wiring installation without removing building finishes. Prior to project closeout contractor shall provide owner with proposal for one year of monitoring services.

1.7 IDENTIFICATION

A. Identify system components wiring, cabling and terminals. Comply with requirements of identification specified in Division 26.

B. Install framed instructions in a location visible from fire alarm control unit.

1.8 GROUNDING

A. Ground fire alarm panel and associated circuits. Comply with IEEE 1100. Install a ground wire from main service ground to fire alarm panel.

1.9 FIELD QUALITY CONTROL

A. Field tests shall be witness by authorities having jurisdiction as required.

B. Engage a factory authorized service agent representative to inspect, test and adjust components, assemblies and equipment installations including connections.

C. Perform tests and inspections as recommended by equipment manufacturer as part of startup sequence and as required by NFPA 72 and local authority having jurisdiction.

D. One year after date of substantial completion, test fire alarm system complying with visual and testing inspection requirements of NFPA 72.

PART 2 - PRODUCTS

2.1 OPERATIONAL DESCRIPTION

A. Fire alarm initiation shall be by initiation devices as shown on plans.

B. All initiation devices shall be addressable.

C. Fire alarm signal shall initiate the following actions as applicable to the project:

1. Continuously operate alarm notification appliances.
2. Identify alarm at fire alarm control unit and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Release fire and smoke doors held open by magnetic door holders.
6. Activate voice alarm communication system.
7. Switch heating, ventilating and air conditioning equipment controls to fire alarm mode.
8. Activate smoke control system (smoke management) at fire fighter smoke control system panel.
9. Activate stairwell and elevator shaft pressurization system.
10. Close smoke dampers in air ducts in air conditioning duct systems.
11. Recall elevators to primary or alternate recall floors.
12. Activate emergency lighting control.
13. Activate emergency shutoffs for gas and fuel supplies.
14. Record events in the system memory.
15. Record events by the system printer.

D. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. Low air pressure switch of a dry pipe sprinkler system.
3. Elevator shunt trip supervision.

E. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts and grounds in designated circuits.
2. Opening, tampering with or removing alarm initiating and supervisory signal-initiating devices.

3. Loss of primary power at fire alarm control unit.
4. Ground or a single break in fire alarm control unit internal circuits.
5. Abnormal AC voltage at fire alarm control unit.
6. Break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at fire alarm control unit or annunciator.
9. Fire pump power failure including a dead phase or phase reversal condition.
10. Low air pressure switch operation on a dry pipe or pre-action sprinkler system.

F. System trouble and supervisory signal actions: Initiate notification appliance and annunciate at fire alarm control unit and remote annunciators. Record the event in system memory.

2.2 DEVICE COLORS

A. Initiation Devices:

1. Red with White Lettering

B. Annunciation Devices:

1. White with Red Lettering

C. Fire alarm Panel and Remote Annunciator:

1. Housing and/or cabinet shall white, black, tan or brown as selected by A/E.

2.3 FIRE ALARM PANEL

A. Unit shall be field programmable, microprocessor based, modular, power limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL. System software and programs shall be held in flash electrically erasable programmable read-only memory, retaining information through failure of a primary and secondary power supplies. System shall be equipped with a real time clock for time annotation of events of the event recorder and printer.

B. Unit shall be equipped with alphanumeric display and system controls with liquid crystal display and keypad.

C. Install no more than 50 addressable devices on each signaling line circuit for notification, initiation and signaling line circuits.

D. Provide all components required for transmission of alarm, supervisory and trouble signals to remote alarm station.

E. System shall be equipped with secondary power supply with batteries, automatic battery charger and automatic transfer switch.

2.4 MANUAL FIRE ALARM BOXES

A. Boxes shall comply with UL 38, show visible indication of operation and shall be mounted on recessed outlet box. If indicated as surface mounted provide manufacturer’s surface back box.

B. Boxes shall use double action mechanism requiring two actions to initiate and alarm and shall be reset with key or wrench operated switch.

C. Where indicated on plans, boxes shall be equipped with factory fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate alarm. Lifting the cover actuates and integral battery powered audible horn intended to discourage false alarm operation. Where located in exterior location provide weatherproof protective shield with similar operation.

2.5 SMOKE DETECTORS

A. Detectors shall comply with UL 268 and shall be equipped with integral addressable module to communicate detector status (normal, alarm or trouble) to fire alarm panel.

B. Detector and associated electronic components shall be mounted in a twist lock module that connects to a fixed base.

C. Detectors shall not require resetting or readjustment after actuation to restore normal operation.

D. Detector shall be equipped with integral visual LED indicating light indicating detector has operated, and indicating power on status.

E. Unless otherwise noted detectors shall be addressable type individually monitored at fire alarm control unit for calibration sensitivity and alarm condition and individually adjustable for sensitivity by fire alarm control unit.

F. Duct smoke detectors shall be equipped with a NEMA 4X weatherproof housing enclosure listed for use with the supplied detector. Each sensor shall have multiple levels of detection sensitivity. Sampling tubes shall be of design and dimension as recommended by manufacturer for specific duct, size, air velocity and installation conditions where applied. Unit shall be equipped with fan shut down relay rated to interrupt fan motor control circuit.

2.6 HEAT DETECTORS

A. Heat Detectors shall comply with UL 521 and shall be equipped with an integral addressable module to communicate detector status (normal, alarm or trouble) to fire alarm panel.

B. Heat detectors shall be actuated either by a fixed temperature or a rate of rise indicating a fire in the detection zone. Temperature and rate of rise shall be as appropriate for application.

C. Detector and associated electronic components shall be mounted in a twist lock module that connects to a fixed base.

2.7 NOTIFICATION APPLIANCES

A. Appliances shall be connected to a notification circuit and equipped for mounting as indicated with screw terminals for system connections.

B. Audio/Visual combination appliances shall be factory integrated devices in a single mounting assembly.

C. Audio chimes and horns shall provide sound pressure level as required for complete coverage of building based on layout shown on plans.

D. Visual devices shall be equipped with field selectable light output letters. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place. Flashing shall be in a temporal pattern synchronized with other units.

E. Voice/Tone appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL. Mounting shall be flush and unit shall be equipped with transformers with taps to match range of acoustical environment of speaker location.

2.8 MAGNETIC DOOR HOLDERS

A. Units shall be equipped for wall or floor mounting as indicated on plans and shall be furnished complete with matching doorplate.

B. Wall mounted units shall be flush unless otherwise noted.

C. Material and finish shall match door hardware.

2.9 REMOTE ANNUNCIATOR

A. Annunciator functions shall match those of fire alarm control unit for alarm supervisory and trouble indications. Manual switching functions shall match those of fire alarm panel, including acknowledging, silencing and testing.

B. Mounting shall be flush type unless otherwise noted.

C. Unit shall be equipped with alphanumeric display and LED indicating lights matching those of fire alarm panel. Provide controls to acknowledge, silence, reset and test functions for alarm, supervisory and trouble signals.

2.10 ADDRESSABLE INTERFACE DEVICE

A. Provide microelectronic monitor module, NRTL listed for use in providing a system address for alarm initiating devices and for wired applications with normally open contacts.

B. Unit shall be equipped with integral relay capable of providing a direct signal to elevator system to either initiate circuit breaker shunt trip for power shutdown or to initiate elevator recall at elevator controller.

2.11 DUAL PATH DIGITAL ALARM COMMUNICATOR

A. Provide Internet and Digital Cellular Fire Alarm Communicator Panel with painted cabinet, key, lock, wall outlet box, Dialer Capture Module, iGSM Communications module, antenna and mounting adapter, power supply, LED display board, transformer and all required accessories for a complete system installation.

B. Provide antennae cable as required to locate antennae in acceptable location for communication.

C. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.

D. Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report service restoration to the central station. If service is lost on both communication paths, transmitter shall initiate the local trouble signal.

E. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both communication paths are available.
2. Programming Device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire alarm unit.

F. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address or zone of the supervisory signal.
3. Address or zone of the supervisory signal.
4. Loss of AC supply or loss of power.
5. Low battery.
6. Abnormal test signal.
7. Communication bus failure.

G. Unit shall be equipped with integral rechargeable battery and automatic charger.

H. Self-test shall be conducted every 24 hours (adjustable) with report transmitted to central station.

2.12 DEVICE GUARDS

A. Where indicated on plans or where device is susceptible to damage, such as receiving areas, warehouse, gymnasiums, etc. provide welded wire mesh of size and shape required for the device requiring protection. Guard shall be factory fabricated and furnished by manufacturer of device. Finish shall match color of protected device.

SECTION 31 05 19 - GEOSYNTHETICS FOR EARTHWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Geotextile for filtration.

1.2 SUBMITTALS

A. Product Data: Manufacturer's data on each product to be used, including physical properties, seaming materials, and installation instructions.

PART 2 PRODUCTS

2.1 GEOSYNTHETIC

A. Provide geosynthetic in largest size sheets as possible to minimize field joining.

B. Uniform thickness according to ASTM D5199.

2.2 Geotextile

A. General:

1. Material: Polyethylene consisting of 5 percent maximum regrind and free of contaminants.

B. Geotextile for Filtration: Capable of allowing liquid passage while restricting solids.

1. Type: Nonwoven.
2. Seams: Mechanically sewn.
   a. Overlap: 3 inches (7.6 cm).
   b. Stitch: Flat; continuous; tied off at ends.
3. Permittivity: 0.5 per second, minimum, ASTM D4491/D4491M.
4. Apparent Opening Size: No.40 (0.425 mm), maximum, when tested in accordance with ASTM D4751.

PART 3 EXECUTION

3.1 INSTALLATION

A. General:

1. Prevent surface drainage from eroding under geosynthetic. Repair undermined areas prior to backfill.
2. Position geosynthetic smooth and wrinkle free on prepared surface; unroll or unfold carefully, avoiding stretching.
3. Perform seaming in adequate lighting. Seam each geosynthetic member immediately after final placement. Clean sheets of dust, dirt, and other foreign matter prior to seaming.

B. Filtration:

1. Install geotextile according to manufacturer's recommendations.
2. Lay sheets in the direction of construction.
3. Repairs: Remove damaged portion of geotextile and seam an additional layer to cover the affected area in all directions. Replace geotextile where surface runoff contamination has occurred.

3.2 BACKFILL

A. Obtain approval for geosynthetic sheet installation from Architect before placing fill.

B. Backfill in a manner to prevent damage to geosynthetic. Repair geosynthetic damaged during backfill operations.

C. Cover geosynthetic in the installed direction in accordance with Section 31 23 23.

END OF SECTION

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SECTION 311000 - SITE CLEARING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: clearing and grubbing the site of undesirable material such as grass, shrubs, trees, other plant life, and debris in preparation for grading activities.

B. Related Sections include the following:
1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and temporary erosion and sedimentation control procedures.
2. Division 01 Section "Execution" for verifying utility locations and for recording field measurements.
3. Division 02 Section “Site Demolition.”
4. Division 31 Section “Excavation and Fill.”

1.2 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.3 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 EXISTING CONDITIONS

A. Site conditions, as depicted on the project drawings, are shown based on available information. The Contractor shall visit the site to familiarize themselves with the existing conditions and verify existing conditions as depicted on the project drawings. The Contractor shall notify the Owner or the Owner’s Representative of any discrepancy between plan and field conditions and shall assume full responsibility for conditions encountered.

1.5 PROTECTION

A. Adjacent Properties: Protect adjacent properties during site clearing operations. Site clearing shall be limited to Owner’s property; any clearing which takes place outside of the Owner’s property shall be the Contractor’s responsibility to repair, at no additional cost to the Owner. The Contractor shall also protect existing structures on adjacent properties; including by not limited to fences, utility lines, manholes, catch basins, valve boxes, poles,

guys and other appurtenances. Damage done to structures on adjacent properties shall be the Contractor's responsibility to repair, at no additional cost to the Owner.

B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.1 CLEARING AND GRUBBING

A. Clearing shall consist of: cutting, removing, and disposing of trees, snags, stumps, shrubs, brush, limbs, and other vegetative growth; clearing shall also include the preservation of trees, shrubs, and vegetative growth, which are not designated to be removed.

B. Grubbing shall consist of the removal and disposal of wood or root matter below the ground surface remaining after clearing and shall include stumps, trunks, roots, or root systems greater than two inches in diameter to a depth of two feet below the natural ground surface.

C. All surface vegetation, trees, stumps, roots, and other protruding objects shall be cleared and grubbed, including required mowing. Undisturbed and sound stumps and nonperishable solid objects located more than two feet below subgrade and slope embankments may remain in place. When authorized, stumps and nonperishable solid objects that are located more than one foot below the ground line may remain if they are located outside the construction limits of excavation and embankment areas.

D. Depressions and cavities resulting from removal of obstructions shall be backfilled and compacted with suitable material as outlined in the project drawings, specifications, and/or Geotechnical Engineering Report, unless further excavation or earthwork is indicated.

E. Disposal of material and debris shall be done under applicable Federal, State, County, and City laws, ordinances, and regulations.

F. Stumps and large timbers shall be removed from the site and legally disposed of by the Contractor.

G. Tree Removal: In general, do not remove existing trees, whether shown on the project drawings or not, that are not in any way of the work or any future installation. Before proceeding with actual clearing operations, identify by an appropriate and clearly recognizable marker trees specifically intended to be preserved. Notify the Owner in

writing when trees to remain have been marked; do not remove any trees until the Owner has approved proposed tree protection and planned removal.

H. Coordination: Complete clearing of the site before topsoil stripping operations are begun. Do not leave loose sticks, roots, branches, or any other debris on the site. Avoid mixture of foreign matter with the topsoil.

3.2 PROTECTION OF EXISTING TREES

A. Throughout construction, properly protect existing trees and vegetation, which are to remain, to be relocated, or which overhang the property line.

B. Do not cut low hanging branches on trees to be saved, unless approved by the Owner. Cut branches which must be cut to eliminate obstructions. Immediately and properly trim any cuts, or accidental injuries to the bark or trunk, and properly trim and paint with a protective tree wound and sealing compound.

C. Permit no stripping of topsoil, cutting or filling, dumping of materials, storage of materials or equipment of any kind, or use by personnel for any activities, whether on or off duty, within the drip line of trees to remain.

END OF SECTION 311000

SECTION 312300 - EXCAVATION AND FILL

PART 1 – GENERAL

1. **SUMMARY**

A. Section includes, but is not limited to, excavation, filling, compacting, and grading in the areas shown on the project drawings to obtain the required subgrade surface properly prepared to receive rock surfacing, pavements, walks, building floor slabs, utilities, drainage structures, or topsoil.

B. Section includes the spreading of topsoil in sufficient quantities to backfill islands, medians, roadway shoulders, and open graded areas.

C. Related Sections include the following:
   1. Division 01 Section "Unit Prices" for unit-price rock excavation and authorized additional excavation provisions.
   2. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
   3. Division 31 Section "Erosion and Sedimentation Controls" for temporary erosion and sedimentation control measures.
   4. Division 31 Section "Turf Base and Drainage" for turf base preparation.
   5. Division 32 Section "Turf and Grasses."

2. DEFINITIONS

A. Backfill: Soil materials placed over bedding to fill a trench or used to fill and excavation.

B. Base Course: Layer placed between the subgrade and paving.

C. Bedding: Aggregate materials placed over the excavated subgrade in a trench before laying pipe and placed beside and over pipe in a trench; including haunches to support sides of pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations.
   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect/Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
   2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction of Engineer. Unauthorized excavation, as well as remedial work directed by Architect/Engineer, shall be at the Contractor's expense.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material ¾ cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by an independent testing agency, according to ASTM D 1586.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other mam-made, stationary features above or below the ground surface.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base, drainage course, or topsoil materials.

K. Utilities include on-site, underground pipes, conduits, ducts, and cables.

3. SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated.
   1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

B. Material Certifications: Gradations from manufacturer for subbase, base, engineered fill, bedding, drainage fill, and/or filler material as necessary.

4. QUALITY ASSURANCE

A. Standards:

   1. American Society of Testing and Materials (ASTM):
      D 698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft)
      D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
      D 1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3(2,700 kN-m/m3))
      D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
      D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
      D 2937 - Standard Test Method for Density of Soil in Place by the DriveCylinder Method
      D 4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
      D 4718 - Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles
   2. American Association of State Highway and Transportation Officials Standard Method of Test (AASHTO):

T-96 - Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact by the Los Angeles Machine.
T-99 - The Moisture-Density Relations of Soils Using a 2.5 kG (5.5 lb) Rammer and a 305 mm (12 in) Drop.
T104 - Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate Test.

B. Testing:
1. If needed per the Owner's sole judgment, a qualified geotechnical testing agency shall be retained to perform all required field and laboratory soil testing necessary to demonstrate compliance with this specification as outlined below in Field Quality Control.
2. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

PART 2 – PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient quantities of satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: As defined by the Geotechnical Engineering Report. In the absence of a Geotechnical Engineering Report the following shall be considered satisfactory soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols, free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: As defined by the Geotechnical Engineering Report. In the absence of a Geotechnical Engineering Report the following shall be considered unsatisfactory soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Backfill and Fill: Satisfactory soil materials.

E. Base: Aggregate for base shall be essentially limestone or dolomite. The aggregate shall not contain more than 15 percent deleterious rock and shale. Sand may be added only for the purpose of reducing the plasticity index of the fraction passing the No. 40 sieve in the finished product. Any sand, silt and clay and any deleterious rock and shale shall be uniformly distributed throughout the material. The fraction passing the No. 40 sieve shall have a maximum plasticity index of six (6). The aggregate shall be in accordance with the following gradation requirements: 100 percent passing the 1 inch sieve, 60-90 percent passing the 1/2 inch sieve, 35-60 percent passing the No. 4 sieve, and 10-35 percent passing the No. 30 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2 inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding: Embedment for ordinary trench conditions is compacted, dense graded, clean, manufactured and processed aggregates described as angular crushed stone, crushed rock, crushed gravel, or crushed stone/sand mixtures containing little or no fines with 100 percent passing a 1 inch sieve, 55-90 percent passing a 1/2 inch sieve, 8-40 percent passing a No. 4 sieve, 0-15 percent passing a No. 10 sieve, and 0-4 percent passing a No. 200 sieve.

H. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate Size 57; with 100 percent passing a 1-1/2 inch sieve, and 0-5 percent passing a No. 8 sieve.

I. Filler Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1 inch sieve and 0-5 percent passing a No. 4 sieve.

J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

K. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of four (4) percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

2.2 SOIL STABILIZATION MATERIALS

A. Typical Materials: Code L, Quicklime, Cement, Flyash

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
   1. Red: Electric.
   2. Yellow: Gas, oil, steam, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems.
   5. Green: Sewer systems.

PART 3 – EXECUTION

3.1 PREPERATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section “Site Demolition” and Division 31 Section “Site Clearing.”

C. Protect subgrades and foundations soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

D. Provide erosion control measures as specified in Section 312500 Erosion and Sedimentation Controls.

3.2 TOPSOIL STRIPPING

A. Remove topsoil from areas within limits of excavation, trenching, borrow and areas designed to receive embankment or compacted fill.

B. Scrape areas clean of all brush, grass, weeds, roots, and other unsuitable materials before stripping topsoil.

C. Strip topsoil to a minimum depth of 6 inches, and to a sufficient depth to remove excessive roots in heavy vegetation or brush areas and as required to segregate topsoil.

D. Stockpile topsoil reasonably free of subsoil, debris, and stones larger than 2 inch diameter. Place stockpile such that it does not interfere with construction operations and existing facilities. Proper drainage of the stockpile shall be maintained. The stockpile shall be protected by erosion control BMPs to prevent sedimentation during runoff. Cover to prevent windblown dust.

E. The Contractor should anticipate that any topsoil stripped from the site and not required to complete site improvements is to be hauled off site and disposed of. However, the Owner retains the right to retain any topsoil prior to removal.

3.3 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
   2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
      a. 24 inches outside of concrete forms other than at footings.
      b. 12 inches outside of concrete forms at footings.
      c. 6 inches outside of minimum required dimensions of concrete cast against grade.
      d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
      e. 6 inches beneath bottom of concrete slabs on grade.
      f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross

sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
    a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
    a. 24 inches outside of concrete forms other than at footings.
    b. 12 inches outside of concrete forms at footings.
    c. 6 inches outside of minimum required dimensions of concrete cast against grade.
    d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
    e. 6 inches beneath bottom of concrete slabs on grade.
    f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

3.4 EXCAVATION FOR STRUCTURES

A. Excavate area adequate to permit erection and removal of forms.

B. Trim to neat lines where concrete is to deposited against earth.

C. Excavate by hand in areas where space and access will not permit use of machines.

D. Restore bottom of excavation to proper elevations in areas over excavated as follows:
    1. For structures supported by piles or caissons, with compacted embankment.
    2. For structures supported by concrete footings or mats, with concrete.

E. Excavate rock, where encountered, to a distance of at least three (3) feet away from outside of structure walls. Bench additional rock excavation required for stability during construction to maintain vertical cuts. Perform such additional excavation and furnish any additional backfill subsequently required at no extra cost to Owner.

3.5 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.6 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations. Excavate trenches to allow installation of top of pipe below the frost line.

B. Do not open more trench in advance of pipe laying than is necessary to expedite the work. One block or 400 feet (whichever is shorter) shall be the maximum length of open trench permitted on any line under construction.

C. Excavate trenches to uniform widths to provide a working clearance on each side of the pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than the top of pipe or conduit unless otherwise indicated.

D. Excavate trenches six (6) inches deeper than bottom of pipe elevation to allow for bedding. Hand excavate for bell of pipe if applicable

E. Trench bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

3.7 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding the Project site and surrounding areas.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavations as temporary drainage ditches.
   2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
   3. Discharge removed water to approved drains or channels. Contractor shall obtain State or local permits for discharge if such are required. Water discharge into streams shall be free of silt or other objectionable materials. Discharge water so that the work in progress and other properties are not damaged. Do not interfere unduly with the use of streets, alleys, private drives, or entrances.
   4. Remove unsuitable, excessively wet materials and replace with approved material.

3.8 SUBGRADE PREPARATION

A. Excavate or place embankment as required to construct subgrades to elevations and grades indicated.

B. Remove all unsuitable material and replace with approved embankment material. Perform all wetting, drying, shaping, and compacting required to prepare a suitable subgrade.

C. Roughen subgrade for embankment by discing or scarifying and wet or dry the top 6 inches as required to ensure bond with embankment.

D. Extend subgrade the full width of surfaced areas plus one foot.

E. Compact the top 12 inches of subgrades for traffic areas and slabs on grade to 95 percent of maximum density (ASTM D 698).

F. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Architect/Engineer, without additional compensation.

G. Proof-roll subgrade after moisture conditioning and compaction to identify soft or disturbed areas. Do not proof-roll wet or saturated subgrades. Proof-rolling will conform with the following:
   1. Use a fully loaded tandem axle dump truck or equipment providing an equivalent loading of not less than 20 tons for proof-rolling.
   2. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction.
   3. Limit vehicle speed to 3 mph.
   4. Undercut and replace soft areas, identified by proof-rolling, with approved fill material.

3.9 EMBANKMENT

A. Place embankment to the contours and elevations indicated in the project drawings. Place embankment material in lifts not exceeding eight (8) inches, uncompacted depth.

B. When rocks larger than four (4) inches are present, they shall be scattered and thoroughly consolidated with sufficient compacted soil to completely fill all voids between rocks. Exclude rocks larger than one half the depth of the lift from the top two (2) feet of the embankment.

C. Uniformly moisten or aerate each lift before compaction to within two (2) percent optimum moisture content. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by two (2) percent and is too wet to compact to specified density.

D. Embankment shall be compacted to 95 percent of maximum density at optimum moisture content as determined by ASTM D 698.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

A. Place and compact initial bedding on trench bottoms and where indicated. Shape bedding to provide continuous support for bells, joints, and barrels of pipes and for joints fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Place and compact bedding materials, to a minimum height of 6 inches over the utility pipe or conduit.

D. Carefully compact material under pipe haunches and bring bedding evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

E. Coordinate backfilling with utility testing.

F. Fill voids with approved backfill materials while shoring and braking, and as sheeting is removed.

G. For areas not under pavement, place and compact final backfill of satisfactory soil material to final subgrade.

H. No rock greater than one (1) foot, measured in any direction, shall be placed within two (2) feet of the top of a pipe in any backfill. No rocks greater than one (1) foot will be allowed in the backfill above service line terminations, tees, or wyes.

I. For areas under pavement, place and compact final backfill using bedding material to final subgrade.

J. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavement and slabs.

3.12 SOIL FILL

A. Disk, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations with satisfactory soil material.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 0 to 4 percent of optimum moisture content.
   1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:
   1. Under pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
   2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
   3. Under lawn or unpaved areas, scarify and compact each layer of backfill or fill soil material at 90 percent. Do not compact top 12 inches.
   4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.
   5. Moisture content at the time of placement shall be maintained between 0 and +4 percent of optimum moisture.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 0.1 feet.
   2. Walks: Plus or minus 1 inch.
   3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.12 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a six (6) inch course filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12 inches of filter material and wrap in drainage fabric, overlapping sides and ends at least six (6) inches. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.

B. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least six (6) inches. Compact each course of filter material to 95 percent of maximum dry density according to ASTM D 698. Place and compact impervious fill material over drainage backfill to final subgrade.

3.13 BASE COURSE

A. Under pavements and walks, place base course on prepared subgrade and as follows:
   1. Place base course material over compacted subgrade.
   2. Compact base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
   3. Shape base to required crown elevations and cross-slope grades.
   4. When thickness of compacted base course is six (6) inches or less, place materials in a single layer.
   5. When thickness of compacted base course exceeds six (6) inches, place materials in equal layers, with no layer more than six (6) inches thick or less than three (3) inches thick when compacted.

B. Pavement Shoulders: Place shoulders along edges of base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.14 DRAINAGE COURSE

A. Under slabs-on-grade, place drainage course on prepared subgrade and as follows:
   1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
   2. Compact drainage course to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
   3. When compacted thickness of drainage course is six (6) inches or less, place materials in a single layer.
   4. When compacted thickness of drainage course exceeds six (6) inches, place materials in equal layers, with no layer more than six (6) inches or less than three (3) inches thick when compacted.

3.15 TOPSOIL PLACEMENT

A. Prior to the start of finish grading, the soil shall be fine graded. The grade shall be smooth without high spots or low spots and shall be free of construction debris. The site shall be weed free and ready for finish grading.

B. Place topsoil on all disturbed areas not scheduled to receive permanent surfacing.

C. Clear areas to receive topsoil of vegetation heavy enough to interfere with proper grading and tillage operations.

D. Clear surfaces of all stones or other objects larger than 3 inches in thickness or diameter, all roots, brush, wire, grade stakes, or other objectionable material.

E. Loosen subgrade by discing or scarifying to a depth of 2 inches wherever compacted by traffic or other causes to permit bonding of the topsoil to the subgrade.

F. Distribute topsoil over required areas without compaction other than that obtained with spreading equipment.

G. Place not less than four (4) inches of top soil over areas to receive topsoil.

H. Shape cuts, fills, and embankments to contours indicated in project drawings.

I. Grade to match contours of adjacent areas and permit good natural drainage.

J. Grade a gentle mound over trenches.

K. After spreading topsoil, clear surface of stones or other objects larger than two (2) inches in thickness or diameter and of objects that might interfere with planting and maintenance operations.

3.16 FIELD QUALITY CONTROL

A. Owner shall engage geotechnical engineer to perform field quality control testing. Contractor shall allow geotechnical testing agency to inspect and test subgrades and each embankment, fill, or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

B. At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.

C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at a minimum at the following locations and frequencies:
   1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2,000 sq. ft. or less of paved area or building slab, but in no case fewer than three (3) tests.
   2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two (2) tests.
   3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two (2) tests.

D. When testing agency reports that subgrades, fills, embankments, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.17 MAINTENANCE AND REPAIR

A. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Settling or erosion shall be filled, repaired and grades reestablished to elevations and slopes indicated.

C. Correction of Settlement:
   1. Settlement of embankments, backfill, or trenches occurring within the one-year correction period after Final Acceptance shall indicate defective work and shall be promptly corrected.
   2. Contractor shall correct settlement and damages arising from or attributable to the settlement.
   3. Make repairs within thirty (30) days from and after due notification by Owner of embankment or backfill settlement and resulting damage.
   4. Make own arrangements for access to the site for purposes of correction and maintenance of corrected areas.

3.18 DISPOSAL

A. Remove surplus soil and waste material, including unsatisfactory soil, trash and debris and legally dispose of it off Owner’s property.

3.19 BLASTING

A. Blasting will not be permitted on this project.

END OF SECTION 312300

SECTION 312500 - EROSION AND SEDIMENTATION CONTROLS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: temporary and permanent management practices as shown on the project drawings, and indicated in the Storm Water Pollution Prevention Plan (SWPPP), and as directed by the Owner during the life of the Contract to control erosion, storm water runoff, and sedimentation.

B. Coordinate temporary erosion control provisions with permanent erosion control features to assure economical, effective, and continuous erosion, sedimentation, and pollution control throughout the construction and stabilization period.

C. Management practices required are not limited to the measures shown on the project drawings and indicated on the SWPPP. Provide additional practices necessitated by actual conditions and methods.

D. Silt and pollution leaving the site and any effects of the release are the sole and total responsibility of the Contractor as Primary, Secondary, or Tertiary Permittee or Operator.

E. Provide Subcontractors with a copy of the Erosion Control Plan and the SWPPP. Post notices requiring Subcontractors to review and comply with the Erosion Control Plan and the SWPPP.

1.2 RELATED DOCUMENTS

A. Conform to the Federal Clean Water Act, as well as the State clean water and erosion control regulations, and the rules and regulations promulgated to each of these Acts.

1.3 DEFINITIONS

A. This partial list of definitions is provided for the Contractor’s convenience only. Obtain copies of the reference documents and learn appropriate terms required to fully implement the Erosion Control Plan and SWPPP.

B. Terms Defined:
   1. Best Management Practices (BMPs): Schedules of activities, prohibitions or practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State and/or the United States of America. BMPs include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
   2. General Contractor: The operator of the common development or site.
   3. Nephelometric Turbidity Unit (NTU): A numerical unit of measure based upon photometric analytical techniques for measuring the light scattered by fine particles of a substance in suspension.
   4. NPDES: National Pollution Discharge Elimination System.

5. Operator: The entity that has the primary day-to-day operational control of those activities at the facility necessary to ensure compliance with Erosion Control Plan and SWPPP requirements and permit conditions.
6. Primary Permittee: The Owner and the operator of a tract of land for a common development, or of a stand-alone facility that is not part of a common development; or a utility company when it is the only entity conducting a construction activity on a piece of property.
7. Qualified Personnel: A person who has successfully completed an erosion and sediment control short course eligible for continuing education units, or an equivalent course approved by EPD ant the State Soil and Water Conservation Commission.
8. Sediment: Solid material, both organic and inorganic, that is in suspension, is being transported, or has been moved from its site of origin by, wind, water, ice, or gravity as a product of erosion.
9. Waters of the State: Rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, wetlands, and other bodies of surface or subsurface water, natural or artificial, lying within or forming a part of the boundaries of the state which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation.

1.4 QUALITY ASSURANCE CRITERIA

A. Project Review: Prior to the preconstruction conference, the Contractor shall review in detail the Erosion Control Plan and the SWPPP.

B. Preconstruction Conference: At the preconstruction conference submit for acceptance a detailed schedule for accomplishment of temporary and permanent erosion control work and installation of BMPs, for clearing and grubbing, grading, construction, paving, and other project activities. Submit for acceptance a proposed method of erosion control for haul roads and borrow pits and a plan for disposal of waste material. Do not begin work until the erosion control schedules and methods of operations have been accepted by the Owner.

C. Provide qualified personnel to supervise provision and maintenance of management practices.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Silt Fence

1. Filter Fabrics: Use filter fabric composed of strong, rot-proof synthetic fibers formed into a fabric of either woven or non-woven type. Use fabric free of any treatment or coating which might significantly alter its physical properties. Use fabric containing stabilizers or inhibitors to make the filaments resistant to deterioration resulting from exposure to sunlight or heat. Use a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative

position with respect to each other. Finish the edges of the fabric to prevent the outer yarn from pulling away from the fabric. Use fabric free of defects or flaws which significantly affect its physical and/or filtering properties. Use fabric with a minimum width of 36 inches. Sew or bond sheets of fabric together. No deviation from any physical requirements will be permitted due to the presence of the seam.

2. Woven Wire Fence: Wire fence fabric at least 32 inches high, with at least 6 horizontal wires. Vertical wires spaced 6 inches apart. Top and bottom wires at least 10 gage. Other wires at least 14 gage.
3. Posts: Straight steel posts, 1.33 pounds per linear foot min., 5 feet long, at 4 feet max. o.c., 1-3/4 inches wide, which have projections for fastening the wire to the fence.
4. Wire staples: Wire No. 9 staple at least 1 ½ inches long.

B. Silt Socks

1. Silt Sock shall be SiltSoxx® by Filtrexx® or approved equal.

C. Mats and Blankets

1. Jute or Hemp Mat: Woven, 76 to 80 warpings per 4 foot width, 39 to 43 weftings per 3 foot length, 0.9 pounds per square yard minimum, 1.5 pounds per square yard maximum.
2. Excelsior Blanket: 80% of fibers 6” min. length, smolder resistant, photo-degradable plastic mesh, maximum 1-1/2 x 3 inches, ¼ inch min. thickness, 0.8 pounds per square yard.
3. Coconut Fiber Blanket: 100% coconut, ¼” min. thickness, 48” min. width, 0.5 pounds per square yard, photo-degradable plastic mesh 5/8” x 5/8” maximum.
4. Wood Fiber Blanket: Free of germination inhibitors, photo-degradable plastic mesh, 5/8” x ¾” max. spacing, 0.35 pounds per square yard minimum dry weight.

D. Polymers

1. Anionic polyacrylamide soil binding agents, environmentally benign, 0.05% monomer by weight.

PART 3 – EXECUTION

3.1 GENERAL REQUIREMENTS

A. Install BMPs in accordance with the Erosion Control Plan and SWPPP.

B. Maintain BMPs throughout construction and until the site is finally stabilized.

C. Implement or assist the Owner with implementation of the SWPPP.

D. Submit reports as required by the local jurisdiction, state, and federal government.

E. Retain records as required by local, state, and federal authorities.

F. Submit or assist the Owner with submittals of applicable permits and termination of permits.

3.2 SCHEDULE

A. Temporary construction entrance(s), silt fences, straw bale dikes, or other initial sediment controls shown on the project drawings must be installed prior to any other work.

B. Sediment basins must be installed within 10 calendar days after construction begins or as soon as 2 or more acres are disturbed, whichever comes first.

3.3 METHODS

A. Several methods of controlling dust and other pollutants include, but are not limited to, the following:

1. Exposing the minimum area of erodible earth.
2. Applying temporary mulch with or without seeding.
3. Using water sprinkler trucks.
4. Using covered haul trucks.
5. Using dust palliatives or penetration asphalt on haul roads.
6. Using plastic sheet coverings.
7. Using gravel.

3.4 AUTHORITY OF ENGINEER

A. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, and borrow and fill operations.

B. The Engineer has the authority to direct the Contractor to provide immediate permanent or temporary erosion control measures to minimize loss of soil due to erosion and contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment.

3.5 CONSTRUCTION

A. Prior to clearing and grubbing operations for the project. Contractor shall identify all areas where the potential for loss of soil due to erosion exists, and shall line the downhill side of the construction site within these areas with straw bales or silt fences to minimize eroded materials from leaving the site. These shall be maintained throughout the construction period and removed when the permanent ground covering is established.

B. The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the accepted schedule. Except where future construction operations will damage slopes, the Contractor shall perform the

permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available.

C. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

D. When erosion is likely to be a problem, clearing and grubbing operations should be scheduled and performed so that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise, temporary erosion control measures may be required between successive construction stages.

E. The Contractor will limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current in accordance with the accepted schedule. If disturbance occurs outside scheduled areas or anticipated work zones, or if weather conditions delay permanent control measures, temporary erosion control measures shall be taken immediately.

3.6 MAINTENANCE

A. Maintain temporary management practices until no longer needed or permanent management practices are provided and the site is stabilized. Remove temporary materials.

B. In the event that temporary management practices are required due to negligence, carelessness, or failure to provide permanent management practices as a part of work as scheduled, provide at no cost to the Owner.

C. When silt deposited in sediment basins occupies more than 30% of the basin capacity, remove the silt. Remove the silt from the site unless otherwise permitted by the Owner. Restore the basin to the conditions and grades as shown on the Drawings.

END OF SECTION 312500

SECTION 31 31 16 - TERMITE CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Chemical soil treatment.

1.2 SUBMITTALS

A. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.

B. Include the EPA Registered Label for termiticide products.

C. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.3 WARRANTY

A. Provide three year installer's warranty against damage to building caused by termites.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain termite control products from single source from single manufacturer.

2.2 CHEMICAL SOIL TREATMENT

A. Toxicant Chemical: EPA Title 7, United States Code, 136 through 136y approved; synthetically color dyed to permit visual identification of treated soil.

B. Manufacturers:

1. Bayer Environmental Science Corp.
2. BASF Corporation
3. Ensystex, Inc.

C. Mixes: Mix toxicant to manufacturer's instructions.

D. Service Life of Treatment: Soil treatment termiticide that is effective for not less than three years against infestation of subterranean termites.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.

B. Verify final grading is complete.

3.2 PREPARATION

A. General: Prepare work areas according to the requirements of authorities having jurisdiction and according to manufacturer's written instructions before beginning application and installation of termite control treatment(s). Remove extraneous sources of wood cellulose and other edible materials, such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

3.3 APPLICATION - CHEMICAL TREATMENT

A. Comply with requirements of U.S. EPA and applicable state and local codes.

B. Application: Mix soil treatment termiticide solution to a uniform consistency. Distribute treatment uniformly. Apply treatment at the product's EPA-Registered Label volume and rate for maximum specified concentration of termiticide to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction.

C. Apply toxicant at following locations:

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil

materials before concrete footings and slabs are placed.

2. Foundations: Soil adjacent to and along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing.

D. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.

E. Re-treat disturbed treated soil with same toxicant as original treatment.

F. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

G. Post warning signs in areas of application

3.4 PROTECTION

A. Do not permit soil grading over treated work.

B. Protect termiticide solution dispersed in treated soils and fills from being diluted by exposure to water spillage or weather until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

END OF SECTION

SECTION 321100 - CAST-IN-PLACE CONCRETE FOR SITEWORK

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes for the following:
   1. Roads, parking lots, sidewalks, curbs and gutters, etc.
   2. Sanitary Structures, Wet Wells, Valve Vaults, Meter Pits, etc.

1.2 RELATED SECTIONS

A. Division 31 Section “Excavation and Fill”

1.3 REFERENCES

A. American Concrete Institute:

1.	ACI 301	Specifications for Structural Concrete
2.	ACI 304R	Guide for Measuring, Mixing, Transporting, and Placing Concrete.
3.	ACI 305R	Hot Weather Concreting
4.	ACI 306R	Cold Weather Concreting
5.	ACI 306.1	Standard Specification for Cold Weather Concreting
6.	ACI 308	Standard Practice for Curing Concrete
7.	ACI 347	Guide to Formwork for Concrete

B. American Society for Testing & Materials:

1.	ASTM B 221	Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
2.	ASTM C 33	Concrete Aggregate
3.	ASTM C 94	Ready-Mixed Concrete
4.	ASTM C 150	Portland Cement
5.	ASTM C 260	Air Entraining Admixtures for Concrete
6.	ASTM C 494	Chemicals Admixtures for Concrete
7.	ASTM C 595M	Blended Hydraulic Cements (Metric)
8.	ASTM C 1017	Chemical Admixtures for Use in Producing Flowing Concrete
9.	ASTM C 1107	Packaged Dry, Hydraulic Cement Grout (Nonshrink)
10.	ASTM D 994	Performed Expansion Joint Filler for Concrete
11.	ASTM D 1190	Concrete Joint Sealer, Hot-Poured Elastic Type
12.	ASTM D 1751	Preformed Expansion Joint Filler for Concrete Paving
13.	ASTM D 1752	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings: Steel Reinforcement Shop Drawings, placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Mill Certificates: Steel producer's certificates of mill analysis, tensile, and bend tests for reinforcing steel, when requested.

E. Construction Joint Layout: Submit a Joint Plan, showing type and location, no smaller than the scale of the project drawings. Joint Details, including dowels, where appropriate. Sealer manufacturer's information.

F. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious Materials
   2. Admixtures
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories
   5. Fiber reinforcement
   6. Joint-filler strips
   7. Waterstops
   8. Repair Materials

G. Contractor should be aware that other submittal requirements (i.e. shop drawings) are contained in other applicable sections of these specifications.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: a qualified installer who employs on the project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities.

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction and qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician Grade 1, according to ACI CP-1 or an equivalent certification program.

2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician – Grade I. Testing Agency laboratory supervisor shall be and ACI-certified Concrete Laboratory Testing Technician – Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from a single manufacturer.

E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcement to the job site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on shop drawings.

B. Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust.

C. Handle reinforcement in such a way to prevent bending and damage.

PART 2 – PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, or other approved materials.
   2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and High-density overlay, Class 1 or better.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist concrete loads without detrimental deformation.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCMENT

A. Reinforcing Bars: Comply with ASTM A 305, Deformed Bars. Conforming to ASTM 615, Grade 60, or ASTM 706, Grade 60 as indicated on the project drawings.

B. Steel Bar Mats: ASTM A 184, fabricated from ASTM A 615, Grade 60, deformed bars, assembled with clips.

C. Plain Steel Wire: ASTM A 82, as drawn.

D. Plain Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

E. Deformed Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, grade 60, plain steel bars, cut true to length with ends square and free of burrs.

B. Supports for Reinforcement: Bolster, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than the concrete as follows:
   1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless steel bar supports.

2.4 MATERIALS

A. Cementitious Materials:

   1. Cement shall be a standard brand Portland cement which shall conform to ASTM C 150. Type I cement with Fly Ash conforming to ASTM C 618, Class F.
   2. Use cement of the same type, brand, and source throughout the project.

B. Water: ASTM C 94/C 94M and potable.

C. Fine Aggregate:

1. Fine Aggregate shall consist of natural sand, manufactured sand, or a combination thereof. The gradation requirements of fine aggregate shall be as follows: 100 percent passing the 3/8 inch sieve, 95-100 percent passing the No. 4 sieve, 40-80 percent passing the No. 16 sieve, 5-30 percent passing the No. 50 sieve, and 0-10 percent passing the No. 100 sieve.
2. Fine Aggregate shall conform to the requirements of ASTM C 33 with respect to deleterious substances, soundness, and abrasion.

D. Course Aggregate:

1. Course Aggregate shall consist of crushed stone or crushed gravel of uniform quality. The gradation requirements of course aggregate shall be as follows: 100 percent passing the 1 inch sieve, 90-100 percent passing the 3/4 inch sieve, 40-60 percent passing the 1/2 inch sieve, 10-30 percent passing the 3/8 inch sieve, and 0-5 percent passing the No. 4 sieve.
2. Course Aggregate shall conform to the requirements of ASTM C 33 with respect to deleterious substances, soundness, and abrasion.

E. Admixtures:

1. Air-Entraining Admixture: ASTM C 260.

2. Chemical:
    a. ASTM C 494 Type A – Water Reducing
    b. ASTM C 494 Type B – Retarding
    c. ASTM C 494 Type C – Accelerating
    d. ASTM C 494 Type D – Water Reducing and Retarding
    e. ASTM C 494 Type E – Water Reducing and Accelerating
    f. ASTM C 494 Type F – Water Reducing, High Range
    g. ASTM C 494 Type G – Water Reducing, High Range and Retarding

3. Plasticizing: ASTM C 1017.

4. Use only admixtures that have been tested and accepted in mix designs and with Engineer’s approval.

5. Comply with ACI 212.1 R “Admixture for Concrete” and ACI 212.2R-81 “Guide for Use of Admixture in Concrete.

F. Waterstops

1. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

i. Greenstreak.
ii. Williams Products, Inc.

b. Profile: Flat dumbbell without center bulb.
c. Dimensions: 4 inches by 3/16 inch thick, nontapered.

G. Curing Materials:

1. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete. Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the following:
   a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
   b. BASF Construction Chemicals - Building Systems; Confilm.
   c. ChemMasters; SprayFilm.
   d. Conspec by Dayton Superior; Aquafilm.
   e. Dayton Superior Corporation; Sure Film (J-74).
   f. Edoco by Dayton Superior; BurkeFilm.
   g. Euclid Chemical Company (The), an RPM company; Eucobar.
   h. Kaufman Products, Inc.; Vapor-Aid.
   i. Lambert Corporation; LAMBCO Skin.
   j. L&M Construction Chemicals, Inc.; E-CON.
   k. Meadows, W. R., Inc.; EVAPRE.
   l. Metalcrete Industries; Waterhold.
   m. Nox-Crete Products Group; MONOFILM.
   n. Sika Corporation; SikaFilm.
   o. SpecChem, LLC; Spec Film.
   p. Symons by Dayton Superior; Finishing Aid.
   q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
   r. Unitex; PRO-FILM.
   s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

4. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the following:
   a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
   b. BASF Construction Chemicals - Building Systems; Kure 200.
   c. ChemMasters; Safe-Cure Clear.
   d. Conspec by Dayton Superior; W.B. Resin Cure.
   e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
   f. Edoco by Dayton Superior; Res X Cure WB.
   g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
   h. Kaufman Products, Inc.; Thinfilm 420.
   i. Lambert Corporation; AQUA KURE - CLEAR.
   j. L&M Construction Chemicals, Inc.; L&M Cure R.
   k. Meadows, W. R., Inc.; 1100-CLEAR.
   l. Nox-Crete Products Group; Resin Cure E.
   m. Right Pointe; Clear Water Resin.
   n. SpecChem, LLC; Spec Rez Clear.

o. Symons by Dayton Superior; Resi-Chem Clear.
p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

H. Expansion and Isolation Joint Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

I. Contractor Joint Sealing Compound shall be one of the following:

1. Cold pour polymer fortified crack fill material generally conforming with ASTM D 1190.
2. Hot pour polymer rubber asphalt sealer meeting the requirements of ASTM D 3405. A certification will be required from the Contractor certifying that the joint sealer meets this specification.

J. Accessories:

1. Vapor Retarder: 10-mil thick clear polyethylene film/mildew resistant, type recommended for below grade application. Overlap (8 inch min.) and watertight-seal all joints.
2. Non-Shrink Grout: CDC-C 588, factory premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,000 psi in 48 hours and 7,000 psi in 28 days.
3. Non-Shrink Grout, Non-Metallic Grout: Factory premixed grout conforming to CRD-C-621-80, “Corps of Engineers Specification for Non-Shrink Grout.”
    a. Acceptable Manufacturers:
    EUCO NS, The Euclid Chemical Company
    Sonogrout, Sonneborn-Contech
    Masterflow 713, Master Builders
    Duragrout, L & M Construction Chemical Co.

2.5 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows: Fly Ash: 20 percent.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

E. Use admixtures according to manufacturer’s written specifications.

2.6 CONCRETE MIXTURES

A. Roads, Parking Lots, Sidewalks, Curbs & Gutters:

1. Minimum Compressive Strength: 4,000 psi at 28 days.
2. Maximum Water-Cementitious Material Ration: 0.45.
3. Slump Limit: 4 inches plus or minus 1 inch.
4. Air Content: Between 5 and 7 percent at point of delivery.

B. Sanitary Structures, Wet Wells, Valve Vaults, Meter Pits, etc.:

1. Minimum Compressive Strength: 4,000 psi at 28 days.
2. Maximum Water-Cementitious Material Ration: 0.44.
3. Slump Limit: 4 inches plus or minus 1 inch.
4. Air Content: Between 5 and 7 percent at point of delivery.

2.7 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 degrees F (29.4 and 32.2 degrees C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F (32.2 degrees C), reducing mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
3. Provide batch ticket for each batch discharged and used in the work, indicating project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in the project.

PART 3 – EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain framework according to ACI 301 and ACI 347.

B. Limit concrete surface irregularities, the maximum deviation of the top surface of any section shall not exceed one-eighth (1/8) inch, or the inside face not more than one-fourth (1/4) inch from planned alignment.

C. Construct forms tight enough to prevent loss of concrete mortar. Retighten forms and bracing before placing concrete, as required, to prevent concrete mortar leaks and maintain proper alignment.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

E. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

F. Forms shall have a depth equal to greater than the prescribed edge thickness of the pavement slab. The minimum length of each section of form used shall be ten (10) feet. Each section or form shall be uniform and free from undesirable bends or warps.

G. Every ten (10) foot length of form shall have at least three (3) form braces which shall be spaced at intervals of not more than five (5) feet, having the end brace not more than six (6) inches from the end of the form. Approved flexible forms shall be used for construction where the radius is 150 feet or less.

3.2 REMOVING AND REUSING FORMS

A. General: Formwork may be removed after concrete has achieved at least 70 percent of its 28-day design compressive strength. Concrete has to be hard enough to not be damaged by form removal operations and curing and protection operations as outlined below.

B. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged from-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.3 VAPOR RETARDERS & BARRIERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
    1. Lap joints 6 inches and fully seal with manufacturer's recommended tape.
    2. Tape around all penetrations & lap edges up over top of foundation wall a min. of 4".

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

3.4 STEEL REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.

F. The maximum angle bar that is intended to be straight may be bent or offset shall be at a slope of 6:1, longitudinal to transverse dimension.

G. If clearances for reinforcing require hooks shorter than standard hooks, fabricator shall be responsible for providing shorter hooks, as required to meet ACI requirements.

H. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheets widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 CONCRETE PLACEMENT, GENERAL

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and subgrade preparation are complete and that required inspections and tests have been performed.

B. Do not add water to concrete during delivery, at project site, or during placement operations unless approved by the Engineer.

C. Before test sampling and placing concrete, water may be added at the project site, subject to the limitations of ACI 301.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be place continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed pavement surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces as required in project drawings.
5. Limit durations of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows:

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 degrees F (4.4 degrees C) for three consecutive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 degrees F (32.2 degrees C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provide water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete in Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

G. No concrete shall be placed around manholes or other structures until they have been adjusted to the required grade and alignment.

3.6 INSTALLATION TOLERANCES

A. Surface Smoothness for Field Event Surfaces shall fall within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
    1. 1/8 inch max in any direction, checked with a 10 foot straight edge

3.7 JOINTS

A. General: : Construct expansion, weakened ¬plane (contraction), and construction joints true to line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

B. Weakened Plane (Contraction) Joints: Provide weakened plane (contraction) joints, sectioning concrete into areas as shown on drawings or as indicated below. Construct weakened ¬plane joints for a depth equal to at least 1/4" wide x 1/4 of concrete thick¬ness, as follows:
    1. Tooled Joints: Form weakened plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
    2. Sawed Joints: Sawed joint WILL NOT BE ALLOWED.
    3. Inserts: Use embedded strips of metal or sealed wood to form weakened-plane joints. Set strips into plastic concrete and carefully remove strips after concrete has hardened.
    4. Unless indicated otherwise on the drawings. Weaken¬ed-plane joints shall be placed at maximum 5 ft. intervals each direction and located to conform to bay spacing wherever possible, or as shown on drawings.

C. Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than ½ hour, except where such placements terminate at expansion joints.
   1. Construct joints as shown or, if not shown, use standard metal keyway-section forms.
   2. Pinned Joints:
      a. Expansion joints, joints between new and existing (old) concrete shall be suitably pinned together prevent vertical misalignment.
      b. Joints between sidewalks and building or canopy slabs shall be suitably pinned together to prevent vertical misalignment.
   3. Provide preformed galvanized steel keyway-section forms or bulkhead forms with keys, unless indicated otherwise. Embed keys at least 1-1/2 inches into concrete.
   4. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.
   5. Provide tie bars at sides of paving strips where indicated.
   6. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

D. Expansion Joints: Use ASTM D 1751, non-extruding premoulded joint filler, 3/4" thick, composed of fiberboard impregnated with asphalt, for expansion joints abutting concrete curbs, catch basins, manholes, inlets, struc¬tures, walks, and other fixed objects, unless otherwise indicated.

E. Expansion Joints: At ramps and walks, use ASTM D 1751, non-extruding premoulded material, ½" thick, unless otherwise noted, composed of fiberboard impregnated with asphalt.

F. Locate expansion joints at intervals not greater than 50' unless indicated otherwise.

G. Extend joint fillers full width and depth of joint, not less than ½ inch or more than 1 inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished con¬crete surface.

H. Furnish joint fillers in one piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.

I. Protect top edge of joint filler during con¬crete placement with a metal cap or other temporary material. Remove protec¬tion after concrete has been placed on both sides of joint.

J. Fillers and Sealants: Comply with require¬ments of applicable Division 7 sections for preparation of joints, materials, installation, and performance.

3.8 FINISHING

A. Mechanical Finishing Machine Method:

   1. The concrete shall be struck off at such a height that after consolidation and final finishing it shall be at the elevations as shown on project drawings.

2. A depth of excess concrete shall be carried in front of the strike off screed for the full width of the slab, whenever the screed is being used to strike off the pavement.
3. The finishing machine shall be provided with a screed, which will consolidate the concrete by pressure.
4. The concrete shall be brought to a true and even surface, free from rock pockets, with the fewest possible number of passes of the machine.
5. The edges of the screeds along the curb line may be notched out to allow for sufficient concrete to form the integral curb.
6. Hand finishing tools shall be kept available for use in case the finishing machine breaks down.

B. Hand Finishing Method:

1. The concrete shall be struck off and consolidated by a vibrating screed or other approved equipment to the elevations shown on the project drawings.
2. When the forward motion of the vibrating screed is stopped, the vibrator shall be shut off and not be allowed to idle in the concrete.
3. Internal mechanical vibration shall be used alongside all formed surfaces.
4. Vibration operation shall be completed prior to final hand finishing.

C. Floating, Straightening, and Edging:

1. After concrete has been struck off and consolidated, it shall be further smoothed by means of a wood or aluminum float at least five (5) feet wide with a handle long enough to reach the entire width of the slab being placed.
2. The float shall be operated so as to remove any excess water and laitance, as well as surface irregularities. After floating operation, the pavement surface should be within the specific tolerances.
3. While concrete is still plastic, the pavement surface shall be tested for smoothness with a ten (10) foot straight edge swung from handles three (3) feet longer than one half the width of the pavement.
4. The straight edge shall be placed on the surface parallel to the centerline of the pavement and at not more than five (5) foot intervals transversely. After each test, the straight edge shall be moved forward one half its length and the operation continued.
5. When irregularities are discovered, they shall be corrected by adding or removing concrete.
6. All disturbed areas shall be again floated with the wooded float and again straight edged.
7. The pavement shall have no depression in which water will stand.
8. Before final finishing is completed and before concrete has taken its initial set, the edges of the pavement shall be carefully finished with an edger of the radius shown on the project drawings.

D. Final Surface Finish:

1. A broom finish shall be used as the final finishing method. A hard bristle broom shall be used, which shall be kept clean and used in such a manner as to provide a uniform texture surface.

2. The final surface of the concrete pavement shall have a uniform gritty texture, free from excessive roughness and true to the grades and cross sections shown on the project drawings.
3. The Engineer may require changes in the final finishing procedure as required to produce the desired final surface texture.

3.9 PROTECTING AND CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing immediately after finishing concrete as soon as marring of the concrete will not occur.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven (7) days with the following materials:
    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12 inch lap over adjacent absorptive covers.
2. Moisture-Retaining Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tap or adhesive. Cure for not less than seven (7) days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.
    a. Removal: after curing period had elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
4. Curing and Sealing Compound: Apply uniformly to pavement indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three (3) hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspection: Engage a qualified testing and inspection agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement. Contact the Engineer a minimum of 24 hours prior to the placement of concrete for his approval and observation of the placement of all reinforcing.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength.

C. Concrete Tests: Testing of composite samples of fresh concrete shall be obtained according to ASTM C 172 and as follows:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
    a. When frequency of testing will provide fewer than five (5) compressive strength tests for each concrete mixture, testing shall be conducted from at least five (5) randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete, one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one hourly test when air temperature is 40 degrees F (4.4 degrees C) and below or when air temperature is 80 degrees F (26.7 degrees C) or above; and one test for each composite sample.
5. Compressive-Strength Testing: ASTM C 39/C 39M.
    a. Test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test result shall be the average compressive strength from a set of two specimens obtained from the same composite sample and tested at the age indicated.
6. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test values falls below specified compressive strength by more than 500 psi.
7. Test results shall be reported, in writing, to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain project identification name and number, date of concrete placement, name of concrete testing and inspection agency, location of concrete batch in work, design compressive strength at 28 days, concrete mixture proportions and

materials, compressive breaking strength, an type of break for both 7 and 28-day tests.

8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Engineer, but will not be used as sole basis for approval or rejection of concrete.
9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by the Engineer.
10. Additional testing and inspection, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
11. Correct deficiencies in the work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 321100

SECTION 321216 - ASPHALT PAVING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: requirements and specifications for the construction of asphalt paving surfaces as shown on the Project Drawings.

B. The work includes providing paving base and final subgrade preparation and fine grading normally incidental to paving operations.

1.2 SUMMARY

A. This Section includes:

1. Cold milling of existing hot-mix asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt paving overlay.
5. Asphalt surface treatments.
6. Imprinted asphalt.

B. Related Sections:

1. See Section 312300 Excavation and Fill for subgrade preparation and base course specifications.

1.3 DEFINITIONS

A. Refer to ASTM D 8-11, Standard Terminology Relating to Materials for Roads and Pavements for definitions of applicable terms.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, include technical data and tested physical and performance properties.

1. Job Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix design proposed for the work.
2. Job Mix Designs: For each job mix proposed for the work.

B. Samples for Verification: For the following products, in manufacturer’s standard sizes unless otherwise indicated.

1. Each paving fabric, 12 inches by 12 inches (300 mm by 300 mm) minimum.
2. Each type and color of preformed traffic calming device.
3. Each pattern and color of imprinted asphalt and precut marking material.

C. Qualification Data: For qualified manufacturer.

D. Material Certifications: For each paving material from manufacturer.

E. Material Test Reports: For each paving material.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving mix manufacturer registered with and approved by the Department of Transportation (DOT) of the state in which the project is located.

B. Installer Qualifications: Imprinted asphalt manufacturer's authorized installer who is trained and approved for installation of imprinted asphalt.

C. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

D. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the DOT of the state in which the project is located for asphalt paving work; with the following exceptions:

1. Measurement and Payment provisions and safety program submittals included in DOT standard specifications do not apply to this Section.

E. Pre-installation Conference: Contractor shall conduct a pre-installation conference at the project site to review methods and procedures related to hot-mix asphalt paving including but not limited to the following:

1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
2. Review condition of subgrade and preparatory work.
3. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
4. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 PROJECT CONDITIONS

A. Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure or if the following conditions are not met:

1. Prime Coat: Minimum surface temperature of 40 degrees F (4.4 degrees C).
2. Tack Coat: Minimum surface temperature of 40 degrees F (4.4 degrees C).
3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
4. Asphalt Base Course: Minimum surface temperature of 35 degrees F (1.7 degrees C) and rising at time of placement.
5. Asphalt Surface Course: Minimum surface temperature of 40 degrees F (4.4 degrees C) and rising at time of placement.

B. Imprinted Asphalt Paving: Proceed with coating imprinted asphalt pavement only when air temperature is at least 50 degrees F (10 degrees C) and rising and is not expected to drop below 50 degrees F (10 degrees C) within eight (8) hours of coating application. Proceed only if no precipitation is expected within two (2) hours of final coating layer application.

PART 2 – PRODUCTS

2.1 AGGREGATE MATERIALS

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: All coarse aggregate shall consist of sound, durable rock, free from cemented lumps or objectionable coatings. The percentage of deleterious substances shall not exceed the values found in Missouri Department of Transportation (MoDOT) Section 1004.2.1. Coarse aggregate shall meet all requirements as outlined in MoDOT Section 1004.

C. Fine Aggregate: Fine aggregate for asphalt paving shall be a fine, granular material passing the 3/8 inch sieve, naturally produced by the disintegration of rock of a siliceous nature and/or manufactured by the mechanical reduction of sound durable rock in accordance with MoDOT Sections 1002.2.1.2 and 1002.2.2. Fine aggregate shall meet all requirements as outlined in MoDOT 1002.3.

D. Mineral Filler: Shall be in accordance with AASHTO M 17.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320 or AASHTO MP 1a, PG 85-100.

B. Asphalt Cement: ASTM D 3381 for viscosity graded material.

C. Prime Coat: Asphalt emulsion prime coat complying with the requirements of MoDOT Sections 408 and 1015.

D. Tack Coat: AASHTO M 140 emulsified asphalt, or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application. Grade SS-1 for SS-1H.

E. Fog Seal: AASHTO M 140 emulsified asphalt, or AASHTO M 208 cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.

F. Water: Potable

G. Undersealing Asphalt: ASTM D 3141, pumping consistency.

2.3 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide granular, liquid, or wettable powder form.

B. Sand: AASHTO M 29, Grade No. 2 or 3.

C. Paving Geotextile: AASHTO M 288, nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.

D. Joint Sealant: ASTM D 6690 Type II hot-applied, single-component, polymer-modified bituminous sealant.

2.4 MIXES

A. Hot-Mix asphalt: Dense, hot laid, hot mix asphalt plant mixes approved by MoDOT.
   1. Base Course: MoDOT Plant Mix Bituminous Base per MoDOT Specification Section 401.
   2. Surface Course: As specified on the project drawings, MoDOT Plant Mix Bituminous Pavement BP-1 or BP-2 per MoDOT Specification Section 401.

B. Emulsified Asphalt Slurry: ASTM D 3910, Grade SS-1 or SS-1H.

C. Use of cutback material is NOT allowed without written approval of the Engineer. If after 48 hours the asphalt is excessively soft or showing signs of alligatoring or cracking, movement or marking from vehicular traffic, then paving shall be removed and replace as directed by Engineer.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade per Section 31 23 00 Excavation and Fill.

C. Proceed with paving only after unsatisfactory conditions identified by proof-rolling have been corrected.

D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 COLD MILLING

A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

   1. Mill to a depth of 1-1/2 inches (38 mm).

2. Mill to a uniform finished surface free of excessive gouges, groves, and ridges.
3. Control rate of milling to prevent tearing of existing asphalt course.
4. Repair or replace curbs, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Transport milled hot-mix asphalt to asphalt recycling facility.
7. Keep milled pavement surface free of loose material and dust.

3.3 PATCHING

A. Hot-mix asphalt pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound aggregate base course to form new subgrade.

B. Portland cement concrete pavement: Break cracked slabs and roll as required to reset concrete pieces firmly.

1. Pump hot undersealing asphalt under rocking slab until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound aggregate base course to form new subgrade.

C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot mix asphalt paving at a rate of 0.05 to 0.15 gal/sq. yd. (0.2 to 0.7 L/sq. m).

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

E. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix asphalt surface course finished flush with adjacent surfaces.

3.4 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/2 inch (12 mm).
   1. Clean cracks and joints in existing hot-mix asphalt pavement.
   2. Use emulsified asphalt slurry to seal cracks and joints less than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
   3. Use hot applied joint sealant to seal cracks and joints more than 1/4 inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply dry, prepared subgrade or surface of compacted aggregate base before applying paving materials. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Prime Coat: Apply uniformly over surface of compacted unbound aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. (0.7 to 2.3 L/sq. m). Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure.

   1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is places and after volatiles have evaporated.
   2. Protected primed substrate from damage until ready to receive paving.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal/sq. yd. (0.2 to 0.74 L/sq. m).

   1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
   2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.6 PAVING GEOTEXTILE INSTALLATION

A. Apply tack coat uniformly to existing pavement surfaces at a rate of 0.20 to 0.30 gal./sq. yd. (0.8 to 1.2 L/sq. m).

B. Place paving geotextile promptly according to manufacturer's written instructions. Broom or roll geotextile smooth and free of wrinkles and folds. Overlap longitudinal joints 4 inches (100 mm) and transverse joints 6 inches (150 mm).

   1. Protect paving geotextile from traffic and other damage and place hot-mix asphalt paving overlay the same day.

3.7 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness with compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at a minimum temperature of 250 degrees F (121 degrees C).
4. Begin applying mix along centerline of crown for crowned sections and on high side of one way slopes unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coats to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).
3. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm),
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.9 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory plate compactors in areas inaccessible rollers.

1. Complete compaction before mix temperature cools to 185 degrees F (85 degrees C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to properly alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.10 INSTALLATION TOLERANCES

A. Pavement Thicknesses: Compact each course to produce the thickness indicated on the project drawings within the following tolerances:

1. Base Course: Plus or minus 1/2 inch (13 mm).
2. Surface Course: Plus 1/4 inch (6 mm), no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10 foot (3 m) straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch (6 mm).
2. Surface Course: 1/8 inch (3 mm).
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch (6 mm).

C. Traffic Calming Devices: Compact and form asphalt to produce the contour indicated and within a tolerance of plus or minus 1/8 inch (3 mm) of height indicated above pavement surface.

3.11 SURFACE TREATMENTS

A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. (0.45 to 0.7 L/sq. m) to existing asphalt pavement and allow curing. With fine sand, lightly dust areas receiving excess fog seal.

B. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow curing. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to AASHTO T 168.

1. Reference maximum theoretical density will be determined by averaging results from four (4) samples of hot-mix asphalt paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
3. One core sample will be taken for every 1,000 sq. yd. (836 sq. m) or less of installed pavement, with no fewer than three (3) cores taken.
4. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2650 and correlated with ASTM D 1188 or ASTM D 2726.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.13 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from project site and legally dispose of them in an EPA approved landfill.

B. Do not allow milled materials to accumulate on-site.

END OF SECTION 321216

SECTION 321723 - PAVEMENT MARKINGS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Provide labor, material, and equipment necessary installation of pavement markings as shown on the Project Drawings.

B. Provide labor, material, and equipment necessary for the removal of existing pavement markings as shown to be removed on the Project Drawings.

1.2 SUBMITTALS

A. Manufacturer's Certificates and Data certifying that the paint, thermoplastic, and/or glass beads conform to the requirements specified.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement marking materials to project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

PART 2 – PRODUCTS

2.1 PAINT MATERIALS

A. Pavement Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed complying with AASHTO M 248, Type N; colors complying with FS TT-P-1952.

B. Colors:

1. White Chip #37925
2. Yellow Chip #33538

C. Glass Beads: AASHTO M 247, Type 1.

2.2 THERMOPLASTIC MATERIALS

A. Thermoplastic materials shall conform to MoDOT Specification Section 620.

PART 3 – EXECUTION

3.1 PAINT INSTALLATION

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

B. Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 degrees F (4.4 degrees C) for oil-based materials; 55 degrees F (12.8 degrees C) for water based materials; and not exceeding 95 degrees F (35 degrees C) for either.

C. Do not apply pavement marking paint until layout, colors, and placement have been verified with the Engineer.

D. Sweep and clean surface to eliminate loose material and dust.

E. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

F. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb./gal. (0.72 kg/L).

3.2 THERMOPLASTIC INSTALLATION

A. Proceed with pavement marking only on clean, dry surfaces and at a minimum pavement surface temperature of 60 degrees F (15.6 degrees C) and a minimum ambient temperature of 50 degrees F (10 degrees C).

B. A primer shall be applied to bituminous surfaces over 2 months old and all concrete surfaces. Primer is not required on new bituminous surfaces unless recommend by the thermoplastic manufacturer. Primer shall be applied and cured in accordance with the recommendations of the thermoplastic manufacturer.

C. Temperature of the thermoplastic at the time of application shall be 400 – 425 degrees F (204.4 – 232.2 degrees C).

D. Furnished markings shall have well defined edges and be free of waviness.

3.3 PROTECTION

A. Conduct operations in such a manner that necessary traffic can move without hindrance.

B. Protect newly painted markings so that, insofar as possible, the tires of passing vehicles will not pick up paint.

3.4 REMOVAL OF MARKINGS

A. Preformed removable tape shall be removed by had methods.

B. Paint shall be removed from Portland cement concrete pavement by a high pressure water blast method, or a low pressure water and sand blast method, or a steel shot blast method.

C. Paint shall be removed from bituminous pavement by either a low pressure water and sand blast method or by a steel shot blast method.

D. Paint shall be removed without damaging the surface or texture and without leaving an image which might mislead traffic.

E. High pressure water blast methods shall not exceed 10,000 psi.

F. Low pressure water and sand blast methods shall not exceed 3,000 psi.

END OF SECTION 321723

SECTION 329200 - TURF AND GRASSES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes: installation of the lawns and native grasses, and guarantee/warranty as shown on the project drawings and as specified herein.

B. Related Sections:
   1. Section 312300 Excavation and Fill contains Topsoil requirements.
   2. Section 312500 Erosion and Sedimentation Controls contains Erosion Control Blanket requirements.

1.2 GENERAL CONDITIONS

A. All scaled dimensions are approximate. Check and verify all site dimensions and receive Engineer's approval prior to proceeding with work under this section.

B. Coordinate installation of all sodding and seeding with Engineer, General Contractor and Irrigation Contractor, if applicable, to avoid interference with other construction.

C. Keep the premises clean and free of excess equipment, materials and debris incidental to work.

D. Protect work and work of others at all times in performance of work, Contractor shall be responsible for any damage to irrigation lines during construction

E. Carefully note all finish grades before commencing work. Restore any finish grade changed during the course of this work to original or intended grades.

F. All disturbed areas shall be hydroseeded except for sodded areas, surfaced areas and solid rock. Disturbed areas outside of authorized construction limits shall be hydroseeded, or sodded at the Contractor's expense.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage and experienced installer who has a minimum of ten years of experience in the sod and seeding industry and native grass industry. Installer shall have completed seeding work similar in material (size and quantity), design and extent to that indicated for this project and with a record of successful established seeded lawns and native grasses. Installer shall provide references of similar project size within the last five years.

B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Engineer's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the work.

C. Topsoil Analysis: Furnish a soil analysis made by a qualified and approved independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand) deleterious material, pH, and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus and potash nutrients and any limestone, aluminum sulfate or other soil amendments to be added to produce satisfactory topsoil.

D. The Contractor or his authorized representative shall be on site at the time of each site inspection or review. If contractor requests a site inspection or review and the site is not found to be in an acceptable condition to hold the review, the hourly fees of the personnel called for the site visit shall be paid by the Contractor.

1.4 SUBMITTALS

A. Sod: The Contractor shall furnish to the Engineer a certification of the seed mixture of the sod, identifying sod source, including name and telephone number of supplier.

B. Seed: The Contractor shall furnish to the Engineer that dealer's guaranteed statement of the composition of the mixture and the percentage of purity and germination of each variety for approval, prior to seeding.

C. Organic Compost: The Contactor shall submit to the Engineer a certificate signed by the manufacturer of the organic compost certifying that the compost used during the seeding process complies with specified requirements.

D. Certification and mix composition of all seed and sod including seed and sod sources and rate of application, and name of supplier.

E. Qualification date for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, name and address of Engineers and Owners, and other information.

F. Material test reports from qualified and approved independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.
1. Analysis of existing surface soil.
2. Analysis of imported topsoil.

G. Sodding and seeding schedule(s) indicating anticipated dates and locations for work to be completed.

H. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

1.5 DELIVERY, STORAGE AND HANDLING

A. All sod must be delivered to the job within twenty-four hours after being cut. Sod shall not be permitted to dry out or not before installation.

B. Seed shall be delivered to the site in bags sealed by vendor, bearing bags tags for seed analysis and date of testing. Contractor shall keep all bag tags on file for the Engineer verification of seed type, quality, and quantity. All seed shall be stored in a manner which does not impair the quality and effectiveness of the seed.

C. Sod: Harvest, deliver, store and handle sod according to the requirements of the American Sod Producers Association's (ASPA) specifications for Turf Grass Sod Materials and Transplanting/Installing.

1.6 PROJECT CONDITIONS

A. Utilities: Determine location of above grade and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required. Maintain grade stakes until parties concerned mutually agree upon removal.

B. Excavation: When conditions detrimental to seeding and sod establishment are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Engineer before proceeding.

C. Finish grading shall be done in preparation for seeding. Any weed growth shall be removed prior to seeding.

1.7 GUARANTEE

A. General Guarantee: The Contractor shall guarantee the production of a close stand of the specified grass, acceptable to the Owner. All repairs, reseeding and resodding are to be done as part of the Contract and at no additional cost to Owner.

PART 2 – PRODUCTS

2.1 SODDING MATERIALS

A. Turfgrass Sod: Approved Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with TPI's "Specification for Turfgrass Sod Materials" in its "Guideline Specification to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species: Sod of grass species shall match existing sod found on site unless none is present, in which case sod of grass species as follows, with not less than 95 percent germination not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
   1. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three cultivars.
   2. Sun and Partial Shade: Proportioned by weight as follows:

a. 50 percent Kentucky bluegrass (Poa pratensis).
b. 30 percent chewings red fescue (Festuca rubra variety).
c. 10 percent perennial ryegrass (Lolium perenne).
d. 10 percent redtop (Agrostis alba).

3. Shade: Proportioned by weight as follows:
   a. 50 percent chewings red fescue (Festuca rubra variety).
   b. 35 percent rough bluegrass (Poa trivialis).
   c. 15 percent redtop (Agrostis alba).

2.2 SEEDING MATERIALS

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology: Rules for Testing Seeds" for purity and germination.

B. Lawn Seed Species: Seed of grass species shall match existing grass found on site unless none is present, in which case seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
   1. Full Sun: Bermudagrass (Cynodon dactylon)
   2. Full Sun: Kentucky bluegrass (Poa pratensis), a minimum of three cultivars.
   3. Sun and Partial Shade: Proportioned by weight as follows:
      a. 50 percent Kentucky bluegrass (Poa pratensis).
      b. 30 percent chewings red fescue (Festuca rubra variety).
      c. 10 percent perennial ryegrass (Lolium perenne).
      d. 10 percent redtop (Agrostis alba).
   4. Shade: Proportioned by weight as follows:
      a. 50 percent chewings red fescue (Festuca rubra variety).
      b. 35 percent rough bluegrass (Poa trivialis).
      c. 15 percent redtop (Agrostis alba).

C. Meadow Seed Species: Fresh clean, dry, new seed, mixed species as follows:
   1. 20 percent Fescue
   2. 15 percent Little Bluestem
   3. 15 percent Side Oats Gramma
   4. 10 percent Broom Sedge
   5. 10 percent Purple Prairie Clover
   6. 10 percent Annual Rye
   7. 10 percent Perennial Ryegrass
   8. 5 percent Orchard Grass
   9. 5 percent Timothy

D. Organic Compost:
   1. All ingredients shall be known and fully disclosed.
   2. Compost shall contain no human sludge or yard waste.
   3. At least 99% of all nitrogen in compost shall be in organic form.
   4. The Carbon: Nitrogen Ratio of the compost shall be less than 30:1 to eliminate Nitrogen starvation.
   5. Compost shall have a pH level between 6.0 and 7.5.
   6. Compost shall have moisture content no greater than 40%.
   7. Compost shall be registered as a fertilizer in the state of Missouri.

8. Contractor shall submit an analysis and sample of the compost to the Owner's Representative for review and approval prior to installation.

E. Mulches:
   1. Straw Mulch: Provide air-dried, clean, mildew and seed free, salt hay or threshed straw of wheat, rye, oats or barley.
   2. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, non- toxic, free of plant growth inhibitors or germination inhibitors, with maximum moisture content of 15 percent and a pH of 4.5 to 6.5.
   3. Asphalt Emulsion Tackifier: Asphalt emulsion ASTM 0977, Grade SS-inhibitors.
   4. Nonasphaltic Tackifier; Colloidal tackifier (Stay-Soil) recommended by fiber-mulch manufacturer for slurry application, non-toxic and free of plant growth inhibitors or germination inhibitors.

PART 3 – EXECUTION

3.1 PREPARATION

A. Sod Bed Preparation:
   1. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1/2 inch in any dimension and other objects that may interfere with planting or maintenance operations.
   2. Moisten prepared lawn areas before planting when soil is dry, Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

B. Seed Bed Preparation:
   1. Repair any eroded areas and make minor grading adjustments to provide good drainage and to meet grade at all walks and paved surfaces.
   2. Clean seed bed surface of all stones larger than 1/2 inch in diameter and all of existing vegetation, roots, brush, wire, grade stakes, and any other deleterious materials.
   3. Using a rear tine tiller or other approved tiller uniformly combine a 2-inch layer of organic compost into existing soil. Drag lawn areas with approved equipment to insure a smooth surface to all lawn areas.
   4. For areas that will be seeded, pre-treat existing lawn with herbicide and reapply to kill off remaining vegetation, if present, prior to seeding.

3.2 INSTALLATION

A. Sodding New Lawns:
   1. Lay sod within 24 hours of stripping. Do not lay sod if dormant or if ground is frozen.
   2. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to sub-grade or sod during installation. Tamp and roll lightly to ensure contact with sub-grade, eliminate air pockets and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
   3. Lay sod across angle of slopes exceeding 3:1.
   4. Anchor sod on slopes exceeding 6:1 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

5. Saturate sod with fine water spray within 2 hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below the sod.
6. Upon completion of the above work, the surface of the sodded areas shall coincide with the finished grade, shall be flush with other seeded or turfed areas, and shall meet the established grade adjacent to any paved areas. Care should be taken in sodding to preserve the finish grade elevations, so that there will be no depressions or uneven places in the surface of the sodded turf areas.

B. Seeding New Lawns:
1. Apply seed mixture simultaneously with application of organic top dressing layer at a rate of 8 lbs. per 1,000 sf.
2. Top dressing with seed shall be applied in a uniform 1/2 inch layer over lawn areas. In areas of existing lawns use a slit seeding method to apply appropriate seed mix.
3. Keep organic top dressing and seed out of plant beds and off of walks, structures and areas not to be seeded.
4. Protect seeded slopes exceeding 4:1 against erosion with erosion-control blankets installed and stapled according to manufacturer's recommendations.
5. Protect seeded slopes exceeding 6:1 against erosion with jute or coil-fiber erosion control mesh installed and stapled according to manufacturer's recommendations.
6. Protect seeded areas with slopes less than 6:1 against erosion by spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 2 tons per acre to form a continuous blanket 1-1/2 inches loose depth over seeded areas. Spread by hand, blower or other suitable equipment.
    a. Anchor straw mulch by crimping into topsoil by suitable mechanical equipment.
    b. Anchor straw mulch by spraying with asphalt-emulsion tackifier at the rate of 10 to 13 gal. per 1000 sq.ft. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas.

C. Hydroseeding:
1. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application
2. Mix slurry with asphalt-emulsion tackifier.
3. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch as a minimum rate of 1500-lb/acre dry weight but less than the rate required to obtain specified seed-sowing rate.

D. Reseeding:
1. Bare Patches or washouts due to heavy rains, prior to establishment and acceptance of the new turf, shall be regraded as needed, reseeded and watered, as often as necessary at Contractor’s expense.

3.3 LAWN MAINTENANCE

A. The maintenance of the lawns shall begin immediately after seeding and sodding and continue until Final Acceptance, but not less than 30 calendar days. The sodded turf area shall be watered daily for the next 10 days after installation to keep soil moist. Then reduce watering to 2 to 3 days per week until turf is well established. Any sod not surviving the first month shall be replaced with new sod from the same source.

B. The maintenance of the seeded turf shall be the Contractor's responsibility until the new grass is 4 inches high and thick enough to receive its first mowing by the Owner and for a minimum of 30 days. The Contractor shall protect and restore seeded areas by watering,

fertilizing, removing weeds, and reseeding as necessary, to ensure a uniform stand of established grass until Final Acceptance of the seed lawn by the Owner's Representative.

C. Mowing of sod lawn is the responsibility of the Contractor until Final Acceptance. The first mowing will not be attempted until the lawn is 4 inches high and thick enough to receive its first mowing. Mow to a height of 3" returning clippings to the lawn. Never mow off more than 1/3 of the grass leaves.

D. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

E. Use fertilizer that will provide actual nitrogen of at least 1 lb. per 1,000 sq. ft. to lawn areas.

3.4 SATISFACTORY LAWNS

A. Satisfactory Seeded Lawn: At end of Contractor’s warranty period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

B. Satisfactory Sodded Lawns: At end of Contractor’s warranty period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.

C. Reestablish lawns that do not comply with the above requirements and continue to maintenance until lawns are satisfactory.

3.5 PROTECTTION

A. Protection of seeded and sodded areas shall begin immediately after the Contractor completes the seeding and sodding work. Contractor shall protect newly graded, seeded and sodded areas from erosion, damage due to landscaping operations, operations by other contractors and trades and trespassers. Contractor shall repair all damaged areas prior to final acceptance.

END OF SECTION 329200

SECTION 331000 - WATER UTILITY DISTRIBUTION

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: requirements and specifications necessary to install the water distribution system as shown on the project drawings.

B. Testing and disinfection of the installed system is incidental to the work.

C. Provide construction staking in accordance with generally accepted practice for layout of underground utilities.

D. The work includes coordination with building plumbing contractors and building plumbing plans.

E. Coordinate responsibilities for installation of meters, vaults, check valves, backflow preventers, taps, valves and appurtenances with the local jurisdiction.

F. Fees related to water meter installation, whether tap, meter or other fees will be paid by the Contractor. Identify fees for installation of water services and provide written report to the Owner.

G. Connections between the new construction and existing mains may be made by the Local Jurisdiction. Water service may be brought to the property line by the Local Jurisdiction. Contractor shall verify the extent to Local Jurisdiction work and coordinate the work with the work of the Local Jurisdiction.

1.2 GENERAL CONDITIONS

A. Coordinate installation of the water distribution system with grading and paving operations.

B. Provide water mains when grade is within 6 inches of final grade and prior to paving base installation.

C. After completion and testing of the water distribution system, provide the Owner with the Contractor's Material and Test Certificates required by the National Fire Protection Association.

1.3 QUALITY ASSURANCE

A. Meet the requirements of the local jurisdiction. Where a conflict exists between this specification and the local County, City, or State specification, meet the more stringent specification.

1.4 SUBMITTALS

A. Product Data for the following:

1. Pipe and Fittings
2. Valves, Meters, other accessories.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves according to the following:
   1. Ensure that valves are dry and internally protected against rust and corrosion.
   2. Protect valves against damage to threaded ends and flanged faces.
   3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves according to the following:
   1. Do not remove end protectors, unless necessary for inspection, then reinstall for storage.
   2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support piping to prevent sagging and bending.

PART 2 – PRODUCTS

2.1 PIPE

A. Ductile Iron or PVC pipe for diameters four (4) inches and larger:

   1. Designate, manufacture, and test ductile iron pipe in accordance with ANSI A21.51, A21.4 and AWWA C-151. Conform outside diameters to A21.50, Class 150 Standards for each size pipe. Wall thickness for each pipe not less than that specified under A21.50 for thickness Class 50 in accordance with AWWA C-104.
   2. Use approved ductile iron pipe push-on joints conforming to AWWA C-111.
   3. PVC may be installed where permitted by local jurisdiction:
      a. For domestic potable water service, meet ASTM D 2241 PVC SDR 21 Class 200.

b. For fire protection systems, meet AWWA C900, rubber gasket joints, DR14, Class 200.

B. PVC pipe for diameters smaller than four (4) inches:

1. Conforming to ASTM D 1785 PVC Schedule 80

2.2 WATER PIPE FITTINGS

A. Ductile irons fittings meeting AWWA C-153, for water pipes four (4) inches or larger. Use mechanical joint fittings, complete with joint accessories, for the class and type of pipe with which they are used. Use cement-lined fittings with the inside and outside bituminous-coated. Mark fittings with class and weight.

B. PVC fittings conforming to ASTM D 2467 for PVC plastic fittings, schedule 80.

2.3 VALVES AND BOXES

A. For valves larger than 2 inches, use cast iron gate valves, AWWA C500 or C509, metal or resilient seated, made by a recognized valve manufacturer: Mueller, Iowa, M&H or approved equal. Use valves constructed of an interchangeable parts system, with parts readily available, and meet the following requirements:

1. Iron body bronze-mounted
2. Double disc, parallel seat "0" ring seal, or resilient seat seals
3. 150 psi minimum working pressure
4. Counterclockwise (left) opening
5. 2-inch operating nut
6. Non-rising stem
7. Joints as required for connection to main

B. For valves up to and including 2 inches, use Bronze Body, Bronze Trim, Rising Stem, Inside Screw, Single Wedge or Disc.

C. Provide underground valves in standard cast iron valve boxes. Use boxes of the two-piece screw type, adjustable to suit the depth of bury and type of valve, with a minimum shaft diameter of 5 1/4 inches. Provide one operating wrench for each ten valves, or fraction thereof.

2.4 FIRE HYDRANTS

A. Use fire hydrants of the most recent AWWA type of construction with a minimum valve opening of 4 1/4 inches. Meet the requirements of AWWA Specification C-502, and equip as follows: Two hose nozzles - 2 ½ inches; one pumper nozzle - 4 ½ inches, Packing - "O" ring; groundline to centerline hose nozzles - 18 inches; groundline to bottom of connection pipe - 48 inches unless otherwise approved. Use operating nut size rotation, and nozzle threads to match Local Jurisdiction Standards. Use traffic model hydrants, utilizing a breakable feature at the groundline consisting of a flange of breakable bolts, and safety stem coupling. Hydrants of the "wet-top" type will not be acceptable. Use hydrants by Mueller, American Darling, M&H, Kennedy, or approved equal.

B. Use hydrants shop-painted above the ground line. After installation, field paint hydrants to match Local Jurisdiction Specifications.

C. Use hydrants with mechanical joints with tie rods and blocking of the line tee.

2.5 WATER METERS

A. Use commercial standard water meters of the size and capacity to meet the design flow condition.

B. Conform to the requirements of Local Jurisdiction.

2.6 BACKFLOW PREVENTERS AND DOUBLE DETECTOR CHECK VALVES

A. Use Commercial Standard Backflow Preventers and Double Detector Check Valves of the size and capacity to meet the design flow condition.

B. Conform to the requirements of the local jurisdiction.

C. Manufacturers: As required by the local jurisdiction; If not locally specified, WATTS, NEPTUNE, or equal.

2.7 THUST BLOCKING

A. Use pipe restrained by concrete thrust blocking as shown on the project drawings, in the event of the following pipe conditions:

1. A change in direction with the use of a tee or bend.
2. Reduction in the size of the line by use of a reducer.
3. Termination of line (dead end).

2.8 DETECTION TAPE

A. Lay metallic detection tape where PVC pipe is installed atop the pipe in the trench no less than 18 inches and no more than 24 inches below finish grade.

B. Meet pipe manufacturer’s specifications.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General

1. Line and Grade: Lay and maintain pipe to the required lines and grades with fittings, valves, and hydrants at the required locations and with joints centered and spigots hung with valve and hydrant stems plumb.

2. Protecting Underground and Surface Structures: Provide, at the Contractor’s expense, temporary support, adequate protection and maintenance of underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the work.

3. Sub-Surface Exploration: Whenever necessary to determine the location of existing pipes, valves, or other underground structure, examine available records and make explorations and excavations.

B. Laying Pipe

1. Trench excavation shall be done in conformance with Section 31 23 00 Excavation and Fill, Article 3.6 Excavations for Utility Trenches.

2. Before lowering pipe into trenches, install bedding material so that when pipe is in the ditch, it will have a bearing for its entire length. Carefully examine the pipe for defects and clean the inside.

3. After placing pipe into ditch, wipe free of dirt, sand and foreign material the bell, gasket, and spigot. Apply to the gasket and spigot a film of lubricant. Enter the plain ends of the pipe into the socket and force the pipe into the socket until it makes contact with the bottom of the socket.

4. At times when pipe laying is not in progress, plug the open ends of the pipe by approved means and so no trench water enters the pipe.

5. Cutting Pipe: Perform cutting of pipe for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damage to the pipe, using approved mechanical cutters.

6. Direction of Laying: Unless otherwise directed, lay pipe with bell ends facing in the direction of laying. For lines on an appreciable slope, bells face upgrade.

7. Permissible Deflection: Whenever necessary to deflect pipe from a straight line either in the vertical or the horizontal plane to avoid obstruction, to plumb stems, or where long radius curves are permitted, use the degree of deflection recommended by the manufacturer of the pipe.

C. Bedding and Backfilling

1. Bedding and Backfilling operations and materials shall conform the project drawings and Section 31 23 00 Excavation and Fill, Article 3.11 Utility Trench Backfill.

D. Mechanical Joints

1. Thoroughly bolt mechanical joints in accordance with the manufacturer's recommendations with Tee Head Bolts and bolts of high strength low-alloy steel having a minimum yield point strength of 40,000 pounds per square inch, and an ultimate tensile strength of 70,000 pounds per square inch. Use gaskets and bolts and nuts that conform to ANSI A21.11. Use glands of high strength cast iron.

2. Installation:

a. The successful operation of the mechanical joint specified requires that the spigot be centrally located in the bell and adequate anchorage be provided where abrupt changes in direction and dead ends occur.
b. Brush the surfaces with which the rubber gasket comes in contact thoroughly with a wire brush just prior to assembly to remove loose rust or foreign material and to provide clean surfaces brushed with soapy water just prior to slipping the gasket over the spigot end and into the bell. Brush soapy water over the gasket prior to installation to remove loose dirt and lubricate the gasket as it is forced into its retaining space.
c. Tighten joint bolts using approved wrenches to a tension recommended by the pipe manufacturer. When tightening bolts, it is essential that the gland be brought up toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange around the socket. Partially tighten the bottom bolt first, then the top bolt, next the bolts at either side, and finally, the remaining bolts. Repeat this cycle until bolts are within the above ranges and torques. If effective sealing is not attained at the maximum torque indicated, disassemble and re-assemble the joint after thorough cleaning. Overstressing of bolts to compensate for poor installation is not permitted.

E. Setting Appurtenances

1. Valves and Fittings: Set and joint gate valves and pipe fittings to new pipe in the manner previously specified for cleaning, laying, and jointing pipe.
2. Valve Boxes: Support, maintain center and plumb over the wrench nut of the gate valve with box cover flush with the surface of the finished pavement.
3. Water Meters, Backflow Preventers, Double Detector Check Valves, Vaults, etc.: Field adjust vault locations to fit into assigned vault areas, set vaults plumb and level, drain vaults as needed, leave no standing water in vaults. Seal wall openings around pipes with flexible sealant and grout to allow for pipe movement and vault settlement. Provide traffic grade top slabs, accessways, and appurtenances where vaults are located in vehicular areas. Provide clearance around valves and flanges to allow for disassembly of piping and equipment.

F. Setting Hydrants

1. General Locations: Locate hydrants in a manner to provide complete accessibility so that the possibility of damage from vehicles or injury to pedestrians is minimized.
2. Position of Nozzles: Use hydrants standing plumb and having pumper nozzles at an angle of 90 degrees in respect to the curb. Use hydrants that have their nozzles located at the height above finished grade required by the Local Jurisdiction, but not less than 12 inches.
3. Drainage at Hydrants: Wherever hydrants are set in impervious soil, excavate a drainage pit below each hydrant, fill and compact with coarse gravel or broken stone mixed with coarse sand under and around the bowl of the hydrant and to a level of 6 inches above the waste opening as shown on the drawings.
4. Cleaning: Thoroughly clean hydrants of dirt and foreign matter before setting.

G. Anchorage of Bends, Tees, and Plugs

1. Limiting Pipe Diameter and Degree of Bend: Apply reaction or thrust blocking on pipelines at tees, plugs, caps, and at bends deflecting 11 degrees or more, or prevent movement by attaching suitable metal rods or straps.
2. Material for Reaction Blocking: Use reaction or thrust blocking of concrete. Place blocking between solid ground and the fitting to be anchored; the area of bearing on pipe and on ground in each instance as shown on the drawings. Place the blocking so that the pipe and fitting joints are accessible for repair.

3.2 TESTING AND DISINFECTION

A. Hydrostatic Tests

1. Pressure During Tests: After the pipe has been laid and partially backfilled, test newly laid pipe or any other valved section of it, unless otherwise directed. Subject to a minimum hydrostatic pressure of 200 psi or 50 psi above the inlet static pressure if the inlet pressure exceeds 150 psi.

2. Duration of Pressure Tests: At least 2 hours.

3. Procedure: Conform to NFPA 24 and AWWA C600. Slowly fill each section of pipe with water and measure the specified test pressure measured at the lowest point elevation by means of a pump connected to the pipe in a satisfactory manner. Provide the pump, pipe connection, gauges, and necessary apparatus. Apply the tests to each valved section in order to check the leakage through valves.

4. Expelling Air Before Test: Before applying the specified test pressure, expel air from the pipe. Make taps, if necessary, at points of highest election and afterward tightly plug.

5. Leakage Defined: Leakage is defined as the quantity of water to be supplied into the newly laid pipe or any valved section of it necessary to maintain the specified leakage test pressure after the pipe has been filled with water and air expelled.

6. Permissible Leakage: Provide suitable means for determining the quantity of water lost by leakage under normal operating pressure. No pipe installation will be accepted until or unless the leakage is less than two (2) quarts per hour per 100 gaskets or joints irrespective of pipe diameter.

7. Variation from Permissible Leakage: When any test of combined sections of pipe laid disclose leakage per mile of pipe greater than that specified, or if individual sections show leakages greater than the specified limit, locate and repair the defective joint until the leakage is within the specified allowance at no cost to the Owner.

8. Time for Making Tests: Subject pipe to hydrostatic pressure, inspect, and test for leakage at any convenient time after partial completion of backfilling. Truck water as necessary to make the test when each section is ready.

B. Sterilization

1. Sterilize in accordance with AWWA C601. Sterilize by the application of clear water containing a minimum of 50 ppm of available chlorine. Keep the chlorine bearing water in contact with the surfaces being sterilized for a period of not less than 24 hours. At the end of the contact period, maintain the chlorine residual in units and at extremities of pipelines at a minimum concentration of 25 ppm.

2. Chlorinating Valves and Hydrants: Operate valves and other appurtenances while the pipeline is filled with the chlorinated agent.

3. Final Flushing and Test: Following chlorination, thoroughly flush treated water from the newly laid pipeline at its extremities until the replacement water throughout its length, upon test, meets the requirements of the Local Jurisdiction. Arrange for test samples.

4. Repetition of Procedures: If the initial treatment prove ineffective, repeat the chlorinating procedure until confirmed tests show that water sampled conforms to the requirements previously stated.

C. Alternate Testing and Sterilization

1. Alternate or additional testing and sterilization methods may be requested by the Local Jurisdiction. Deviations from these methods may be employed with permission of the Local Jurisdiction.

END OF SECTION 331000

SECTION 333100 - SEWER UTILITY SEWERAGE PIPING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: requirements and specifications necessary to install the sanitary sewer piping, valves, and other accessories, excluding manholes, as shown on the project drawings.

B. Testing of the installed system is incidental to the work.

C. Provide construction staking in accordance with generally accepted practice for layout of underground utilities.

D. The work includes coordination with building plumbing contractors and building plumbing plans.

E. Fees related to sewer service installation, whether tap, meter or other fees will be paid by the Contractor. Identify fees for installation of sewer services and provide written report to the Owner.

F. Connections between the new construction and existing mains may be made by the Local Jurisdiction. Sewer service may be brought to the property line by the Local Jurisdiction. Contractor shall verify the extent to Local Jurisdiction work and coordinate the work with the work of the Local Jurisdiction.

1.2 RELATED SECTIONS

A. Section 312300 Excavation and Fill for trenching, bedding, and backfill requirements.

B. Section 333900 Sanitary Utility Sewerage Structures for manhole requirements.

1.3 GENERAL CONDITIONS

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.

B. Locate existing structures and piping to be closed and abandoned.

C. Existing Utilities: Do no interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated. Notify property owner not less than two days in advance of proposed utility interruptions.

1.4 SUBMITTALS

A. Product Data for the following:
   1. Pipe and Fittings

2. Valves and cleanouts.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 **DELIVERY, STORAGE, AND HANDLING**

A. Preparation for Transport: Prepare valves according to the following:
   1. Ensure that valves are dry and internally protected against rust and corrosion.
   2. Protect valves against damage to threaded ends and flanged faces.
   3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves according to the following:
   1. Do not remove end protectors, unless necessary for inspection, then reinstall for storage.
   2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support piping to prevent sagging and bending.

PART 2 – PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 “Piping Applications” Article for applications of pipe and fittings materials.

2.2 PIPE AND FITTINGS

A. Ductile Iron Pressure Pipe: AWWA C151.

   1. Standard-Pattern, Ductile Iron Fittings: AWWA C110, ductile or gray iron, buried or flooded pipe shall have mechanical joints, interior or exposed pipe shall be flanged unless otherwise indicated or specified.
   2. Gaskets: AWWA C111, Rubber.
   3. Flanges: Ductile Iron, conforming to ANSI B16.1 and shall be drilled class 125.
   4. Flange Bolts: Bolts shall conform to ASTM A307 Grade B.

5. Flange Gaskets: Shall be 1/8” thick, full-faced synthetic rubber.

B. Ductile Iron Gravity Sewer Pipe: ASTM A 746, for push-on joints.

1. Standard-Pattern, Ductile Iron Fittings: AWWA C110, ductile or gray iron, for push-on joints.
2. Gaskets: AWWA C111, Rubber.

C. PVC Pressure Pipe: AWWA C900, Class 200 or ASTM 2241, 200 psi, SDR 21, for gasketed joints.

1. Ductile Iron, Compact Fittings: AWWA C153, for push-on joints.
2. Gaskets for Ductile Iron Fittings: AWWA C111, Rubber.

D. PVC Gravity Sewer Pipe and Fittings: As specified on project drawings and according to the following:

1. SDR 35 and SDR 21 PVC Sewer Pipe and Fittings: ASTM D 3034, gasketed joints. Gaskets are to conform to ASTM F 477, elastomeric seals.
2. Schedule 40 and Schedule 80 PVC Sewer Pipe and Fittings: ASTM D 3034. Solvent-cemented joints. Solvent Cements are to conform to ASTM D 2564 and ASTM D 2855.

2.3 SPECIAL PIPE COUPLINGS AND FITTINGS

A. Sleeve-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for non-pressure joints.

1. Sleeve material for cast-iron soil pipe: ASTM C 564, rubber.
2. Sleeve material for plastic pipe: ASTM F 477, elastomeric seal.
3. Sleeve material for dissimilar pipe: Compatible with pipe materials being joined.
4. Bands: Stainless steel, at least one at each pipe insert.

B. Bushing-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric bushing fabricated to mate with OD of smaller pipe and ID of adjoining larger pipe for non-pressure joints.

1. Material for cast-iron soil pipe: ASTM C 564, rubber.
2. Material for plastic pipe: ASTM F 477, elastomeric seal.
3. Sleeve material for dissimilar pipe: Compatible with pipe materials being joined.

C. Pressure-Type Pipe Couplings: AWWA C 219, iron-body sleeve assembly matching OD of pipes to be joined, with AWWA C 111 rubber gaskets, bolts, and nuts. Include PE film, pipe encasement.

D. Ductile Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical joint ends complying with AWWA C 110 or AWWA C 153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig minimum working pressure and for offset and expansion indicated. Include PE film, pipe encasement.

E. Ductile Iron, Deflection Fittings: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C 110 or AWWA C 153. Include rating for 250-psig minimum working pressure and for up to 15 degrees deflection. Include PE film, pipe encasement.

F. Ductile Iron, Expansion Joints: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile iron, bell-and-spigot end sections complying with AWWA C 110 or AWWA C 153. Include rating for 250-psig minimum working pressure and for expansion indicated. Include PE film, pipe encasement.

2.4 VALVES AND ACCESSORIES

A. Non-rising Stem, Resilient-Seated Gate Valves, 3 inch NPS and larger: AWWA C 509, gray or ductile iron body and bonnet; with bronze or gray or ductile iron gate, resilient seats, bronze stem, and stem nut. Include 200-psig minimum working pressure design, interior coating according to AWWA C 550, and buried valves shall be mechanical-joint with a 2 inch operating nut, exposed or interior valves shall have flanged ends and have hand wheel operators. Valves shall open counter clockwise. Valve stems shall use double “O” ring seals.

B. Check Valves: AWWA C 508, with 175-psig working pressure rating. Include interior coating according to AWWA C 550. Valve hinge pins shall be stainless steel. Valve disc shall be full opening with a composition to metal seal. Valve shall be flanged unless noted otherwise on the project drawings. Valves shall be equipped with an external lever that is spring assisted. The spring tension shall be field adjustable by a hex nut. The lever arm shall be keyed to the valve hinge shaft.

C. Check Valves – Cushioned: AWWA C 508, with 175-psig working pressure rating, with addition of exterior cushion chamber. Include interior coating according to AWWA C 550. Swing disc type with stainless steel shaft and flanged body. Flanges shall be ANSI B16.1, Class 125. Valve disc shall be external lever and adjustable counterweight to initiate closure. Valves shall be a metal to composition seat.

D. Eccentric Plug Valves:

1. Plug valves shall be quarter-turn non-lubricated eccentric type with resilient faced plug. Alternate seat and plug materials may be considered provided the specification is met and, in addition, the manufacturer must prove prior to approval that the valve meets AWWA C 504 “proof of design tests” (10,000 cycles) in both directions. Flanged valve ends shall be faced and drilled to conform to ANSI B16.1, Class 150 for diameter and drilling. Mechanical or push-on type rubber-gasketed joint ends shall conform to AWWA C 111. Port areas for valves smaller than 20-inch shall be at least 80 percent of full pipe area. Port areas for valves 24-inch and larger shall be at least 70 percent of full pipe area.
2. Materials and Construction:
    a. Bodies shall be of ASTM A 136, Class B cast iron.
    b. Valve plug shall be ASTM A 126, Class B cast iron or ASTM A 536 ductile iron. Resilient plug facing shall be synthetic rubber, neoprene or Buna N compound suitable for use with water and wastewater applications.
    c. Seats shall be a raised welded overlay of 90 percent pure nickel, a minimum of 0.125 inch thick and 0.50 inch wide, conforming to AWWA C 504. When the plug is in the closed position, the resilient plug facing shall contact only nickel. Sprayed or plated mating seat surfaces are not acceptable for resilient plugs.
    d. Bearings shall be replaceable. Sleeve bearings in the upper and lower journals shall be permanently lubricated 316 stainless steel per ASTM A 743 Grade CF-8M. Nonmetallic journal bearings shall not be acceptable. Thrust bearings shall be Teflon.
    e. Shaft seals shall be self-adjusting chevron-type conforming to AWWA C 504. Valve shall be designed so it can be repacked while the valve is in

line and under pressure without removing the actuator. O-ring seals shall not be acceptable in vales larger than 3 inches.

f. All exposed fastened hardware shall be zinc plated or stainless steel. Provide stainless steel bolting on buried service valves.

3. Manual Operators:
   a. All valves shall open counterclockwise.
   b. Provide indicators to show position of plug except on buried operators.
   c. Actuators: manual valves shall have lever or worm gear actuators with handwheels, chainwheels, tee wrenches, extension stems, floorstands, etc., as shown on the plans or as called for in the valve schedule. Lever actuators shall be furnished for valves 8 inches or smaller where the maximum shutoff pressure is 25 psi or less as indicated on the plans or in the valve schedule. Worm gear actuators shall be furnished for all valves 4 inches or larger where the maximum reverse shutoff pressure is greater than 25 psi. Worm gear actuators shall be sized for 150 psi. all gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft and the quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. This adjustable stop shall be the only adjustment necessary to set the clearance between the valve plug and the seat while the valve is in line and under pressure. Handwheel and chainwheel sized for worm gear actuators shall be no smaller than 6 inches in diameter and no larger than twice the diameter of the actuator's gear sector. All exposed nuts, bolts, and washers shall be zinc plated. Valves and gear actuators for buried or submerged service shall have seals on all shafts and gaskets on the valve and actuator convers to prevent the entry of water. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gaskets seals. All exposed nuts, bolts, springs, and washers shall be stainless steel.
   d. Handwheels shall be located for easy access on exposed valves.
   e. Buried valves shall be operated by a 2 inch AWWA nut with valve box.
4. Testing: Furnish certified copies of results of tests prior to shipment. All valves shall be subjected to an AWWA C 504 procedure leak test at 150 psi against the face of the plug and a body hydrostatic test at 300 psi. Valves shall be capable of providing drip-tight shutoff up to the full leak test rating with pressure in either direction.

E. Ball Valves (Polymer Service and Non-Potable Water 2 inch and smaller):

1. Ball valves shall be PVC true union with either solvent socket or threaded pipe connections. Pressure rating shall exceed 230 psi.
2. Seats shall be PTFE with backing rings. Backing rings and seals shall be Ethylene-propylene-diene-monomer rubber (EPDM).
3. PVC shall meet or exceed cell classification 12454B, ASTM D 1784.
4. Socket end connections shall conform to ASTM D 2467. Threaded pipe connections shall conform to ANSI B2.1.
5. Exposed valves shall be operated by a 2 inch AWWA nut. Valve shall not be buried.

F. Backwater Valves:

1. Gray-Iron Backwater Valves: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
   a. Horizontal Type: With swing check valve and hub-and-spigot ends.

b. Combination Horizontal and Manual Gate-Valve Type: With swing check valve, integral gate valve, and hub-and-spigot ends.
c. Terminal Type: With bronze seat, swing check valve, and hub inlet.

2. PVC Backwater Valves: Similar to ASME A112.14.1, horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.

G. Air Release Valves: Shall be A.R.I. model D-025 combination air valve for sewage.

H. Appurtenances:

1. Trace Wire: Magnetic detectible conductor (#12 copper).

2.5 POLYETHYLENE PLASTIC (PE) FILM, PIPE ENCASEMENT

A. ASTM A 674 or AWWA C 105; PE film, tube, or sheet, 8-mil thickness.

2.6 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:

1. Light Duty: In earth or grass foot-traffic areas.
2. Medium Duty: In paved foot-traffic areas.
3. Heavy Duty: In vehicle-traffic service areas.
4. Extra-Heavy Duty: In roads.
5. Sewer Piping Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.7 DETECTABLE WARNING TAPE

A. Detectable Warning Tape: Acid and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum six (6) inches wide and four (4) mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored green for sewer systems.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that trench cut and excavation is ready to receive work and excavations, dimensions, and elevations are as indicated on the project drawings.

3.2 EARTHWORK

A. Excavation, trenching, bedding, and backfilling are specified in Section 31 23 00 Excavation and Fill.

B. Hand trim excavations to required elevations. Correct over excavation with bedding material.

C. Remove large stones or other hard matter that could damage pipe or impede consistent backfilling or compaction.

3.3 IDENTIFICATION

A. Install detectable warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.4 PIPING APPLICATIONS

A. General: Include watertight joints.

B. Refer to Part 2 of this Section for detailed specifications for piping and fitting products listed below. Use pipe, fittings, and joining methods according to applications indicated.

C. Gravity-Flow Piping: As indicated on the project drawings:

1. NPS 4 and NPS 6: PVC sewer pipe and fittings, solvent-cemented joints, or gaskets and gasketed joints. (4 inch pipe is allowed on gravity service laterals from building to main only. All gravity sewer mains must be a minimum of 6 inches in diameter).
2. NPS 8 and NPS 10: PVC sewer pipe and fittings, or gaskets and gasketed joints.
3. NPS 12 and NPS 15: PVC sewer pipe and fittings, or gaskets and gasketed joints.

D. Force-Main Piping: As indicated on the project drawings:

1. NPS 4 to NPS 8: Ductile Iron sewer pipe; standard or compact-pattern, ductile iron fittings; gaskets; and gasketed joints.
2. NPS 4 to NPS 8: PVC pressure pipe, PVC pressure fittings, gaskets, and gasketed joints.

3.5 SPECIAL PIPE AND COUPLING APPLICATIONS

A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

1. Use the following pipe couplings for non-pressure applications:
    a. Sleeve type to join piping, of same size, or with small difference in OD.
    b. Increase/reducer-pattern, sleeve type to join piping of different sizes.
    c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
2. Use pressure-type pipe couplings for force main joints. Include PE film, pipe encasement.

B. Special Pipe Fittings: Use where indicated. Include PE film, pipe encasement.

3.6 INSTALLATION, GENERAL

A. General Locations and Arrangements: Project drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

C. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

D. Molded Tees shall be used for all "tee" connections for new construction of gravity sewers. Inserta-Tees® (or approved equal) shall be used on all tap connections to existing gravity sewer pipes.

E. Install ductile iron, force main piping according to AWWA C 600.

F. Install PVC force main piping according to AWWA M 23.

G. Location of Sewers with respect to Water Mains:

1. Horizontal Separation: Whenever possible, any sanitary sewer shall be laid at least 10 feet, horizontally, from a water main. When local conditions prevent a separation of 10 feet, the Missouri Department of Natural Resources (MoDNR) may allow a sanitary sewer to be laid closer than 10 feet to a water main provided that the sanitary sewer is laid at least 18 inches below the bottom of the water main. When it is impossible to obtain proper horizontal and vertical separation as stipulated above, both the water main and sewer must be constructed of mechanical or slip-on joint ductile iron pipe and should be pressure tested to assure watertightness before backfilling. Both of these alternatives must be specifically approved by MoDNR on a case-by-case basis.

2. Vertical Separation: Whenever sanitary sewers must cross water mains, the sewer shall be laid at such an elevation that the bottom of the water main is no closer than 18 inches above the top of the sewer. The vertical separation shall be maintained for that portion of the sanitary sewer located within 10 feet, horizontally, of any water main it crosses. The crossing shall be arranged so that the sewer joints will be equal distance and as far as possible from the water main joints.

3. Unusual Conditions: Where conditions prevent the minimum vertical separation set forth above from being maintained, or when it is necessary for the sewer line to pass over a water main, the sewer line shall be laid with slip-on mechanical joint ductile iron pipe, and the sewer line shall extend on each side of the crossing a distance from the water main of at least 10 feet. In making such a crossing, a full length of ductile iron pipe must be centered over or under the water main to be

crossed so that the joints will be equidistant from the water main and as remote therefore as possible. The water main must also be constructed of ductile iron pipe with slip-on or mechanical joints until the nominal distance from the sewer line to the water main is at least 10 feet. Where a water main must cross under a sewer, a vertical separation of 18 inches between the bottom of the sewer and the top of the water main shall be maintained, with adequate support, especially for the larger sized sewer lines, to prevent them from settling on and breaking the water main. The sewer shall be constructed of ductile iron pipe for a distance of 10 feet on either side of the crossing, or other suitable protection as approved by the MoDNR.

H. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

I. All gravity sewer lines shall be installed with minimum slopes according to the following table:

Sewer Size	Minimum Slope (feet per 100 feet)
6 in.	0.60
8 in.	0.40
9 in.	0.33
10 in.	0.28
12 in.	0.22
14 in.	0.17
15 in.	0.15
16 in.	0.14
18 in.	0.12
21 in.	0.10
24 in.	0.08
27 in.	0.067
30 in.	0.058
36 in.	0.046

3.7 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to installations indicated.

B. Ductile Iron Sewer Pipe with Ductile Iron Fittings: According to AWWA C 600. Install PE film, pipe encasement over ductile iron sewer pipe and ductile iron fittings according to ASTM A 674 or AWWA C 105.

C. PVC Pressure Pipe and Fittings: Join and install according to AWWA M 23.

D. PVC Sewer Pipe and Fittings: As follows:

1. Join pipe and gasketed fittings with gaskets according to ASTM D 2321.
2. Join profile sewer pipe fittings with gaskets according to ASTM D 2321 and manufacturer's written instructions.

E. System Piping Joints: Make joints using system manufacturer's couplings, unless otherwise indicated.

F. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.

G. Install with top surfaces of components, except piping, flush with finished surface.

3.8 REACTION ANCHORAGE AND BLOCKING

A. All unplugged bell and spigot or all-bell tees, Y-branches and bends deflecting 11-1/4 degrees or more with are installed in piping subject to internal hydrostatic heads in excess of 15 feet in exposed, or 30 feet in buried applications, shall be provided with suitable reaction blocking, struts, anchors, clamps, joint harness, or other adequate means for preventing movement of the pipe cause by unbalanced internal liquid pressure.

B. Trench Installation: Where in trench, the forgoing designated fittings shall be provided with concrete thrust blocking between the fitting and solid, undisturbed ground in each case, except where solid ground blocking support is not available. At the tops of slopes vertical angle bends shall be anchored by means of steel strap or rod anchors securely embedded in or attached to a mass of concrete of sufficient weight to resist the hydraulic thrust at the maximum pressures to which the pipe will be subjected. All concrete blocking and anchors shall be installed in such a manner that all joints between pipe and fittings are accessible for repair.

C. The bearing area of concrete reaction blocking against the ground or trench bank shall be as shown by the plans or as directed be the Engineer in each case. In the even that adequate support against undisturbed ground cannot be obtained, metal harness anchorages consisting of steel rods or bolts across the joint and securely anchored to pipe and fittings or other adequate anchorage facilities approved by the Engineer shall be installed to provide the necessary support. Should the lack of a solid vertical excavation face be due to careless or otherwise improper trench excavation, the entire cost of furnishing and installing metal harness anchorages in excess of the contract value of the concrete blocking replaced by such anchorages shall be borne by the Contractor.

D. For other locations: Reaction blocking, struts, anchorages, or other supports for fittings installed in fills or other unstable ground, above grade, or exposed within structures, shall be provided as required by the project drawings or as directed by the Engineer.

E. Protection of meal surfaces: All steel clamps, rods, bolts and other metal accessories used in reaction anchorages or joint harness subject to submergence or contact with earth or other fill material and not encased in concrete shall be adequately protected from corrosion with not less than two coats of Koppers "Bitumastic No. 50", or approved equal, heavy coal tar coating material, applied to clean, dry metal surfaces. The first coat shall be dry and hard before the second coat is applied. Metal surfaces exposed above grade or within

structure shall be painted with two coats (in addition to a primer coat) of paint approved by the Engineer.

F. Place cast-in-place concrete according to ACI 318 and ACI 350R.

3.9 BACKWATER VALVE INSTALLATION

A. Install horizontal units in piping where indicated.

B. Install combination units in piping and in structures where indicated.

3.10 CLEANOUT INSTALLATION

A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Install piping so cleanouts open in direction of flow of sewer.

B. Set cleanout frames and covers in earth, set with tops a minimum of one (1) inch above surrounding grade.

C. Set cleanout frames and covers in pavement flush with pavement surface.

3.11 AIR RELEASE FACILITIES

A. Air release valves shall be A.R.I. model D-025 combination air valve for sewage.

B. Air release facilities shall be located at the high points of all pressure sewer systems and shall be properly sized to prevent buildup of air or gasses that will impede flow of the wastewater.

C. Air release valves must be automatic and designed to prevent wastewater solids and grease from reaching the valve operating mechanism.

D. Provisions for cleaning the valve by back flushing should be provided.

3.12 TAP CONNECTIONS

A. Tap connections to existing sanitary sewer mains shall be made in accordance with the Local Jurisdiction's requirements and specifications. It is the Contractor's responsibility to coordinate tap connections with the Local Jurisdiction and to verify that local requirements and specifications are followed. If no such specifications exist, tap connections shall be made as outlined below:

1. Use Inserta-Tee® (or approved equal) to make branch connections into existing piping, NPS 4 to NPS 20.
2. Make branch connections from side into existing piping, NPS 21 or larger, or to underground structures by cutting opening into existing unit large enough to allow three (3) inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or

structure wall, encase entering connection in six (6) inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

a. Use concrete that will attain a minimum 3,000 psi 28-day compressive strength.
b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

3. Protect existing piping and structures to prevent concrete or other debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.13 CLOSING ABANDONED SANITARY SEWER PIPE

A. Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping has been closed. Use either procedure below:

1. Close open ends of piping with at least eight (8) inch thick brick masonry bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

3.14 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.

1. Place plug in end of incomplete piping at end of day and when work stops.
2. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at the completion of the project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include:
    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 95 percent of piping diameter.
    c. Crushed, broken, cracked, or otherwise damaged pipe.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Re-inspect and repeat procedure until results are satisfactory.

3.15 FIELD TESTING

A. General:

1. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
2. Leaks and loss in test pressure constitute defects that must be repaired.
3. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

B. Pressure Tests:

1. The Contractor shall furnish all pumps, piping, labor, and other materials and services necessary to bring the piping up to the specified test pressure.
2. All pipes shall be pressure tested. Pipes which will be pressurized under normal operating conditions shall conform to the requirements of the hydrostatic pressure test. All other piping shall meet the requirements of the air leakage test.
3. Pipe in the sections to be tested shall be backfilled or center loaded with thrust blocks installed and completely backfilled. Interior pipe supports and restraint systems shall be completely installed prior to testing.

C. Hydrostatic Pressure Test:

1. Test connections shall be made and the pipe filled with water. Unless otherwise specified, a pressure of not less than 1.25 times the normal operating pressure (for the lowest point on the pipe line) but not less than 100 psi or not more than the rated working pressure of the pipe shall be used for testing.
2. After air removal, water shall be pumped in to bring the pipe to the specified pressure. The hydrostatic test shall be of at least a 2-hour duration. Test pressure shall not vary by more than plus or minus five (5) psi for the duration of the test. After two hours, additional water shall be drawn from a container of known volume. The amount of water required to return the system to the specified pressure shall not exceed the amount determined by the following formula:

$$Q = SD(P)^{1/2}/133200 \qquad \text{(Equation 1)}$$

Where

Q = Total allowable leakage in gallons per hour.
S = Length of section tested, feet.
D = Nominal pipe diameter, inches.
P = Test pressure, psi.

3. The allowable leakage must not exceed the volumes specified below for each 1,000 feet of the particular diameter of pipe being tested (table has been calculated based on Equation 1):

Hydrostatic Testing Allowance per 1,000 ft of Pipeline – gph

(AWWA C 600)

Avg. Test Pressure	Nominal Pipe Diameter (in)										
(psi)	1.5	2	3	4	6	8	10	12	14	16	18
100	0.11	0.15	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35
125	0.13	0.17	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51
150	0.14	0.18	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66
175	0.15	0.20	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79
200	0.16	0.21	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91

4. All exposed pipe, fittings, valves, and joints shall be inspected and all evidence of moisture appearing on the surface of the ground during the test shall be investigated by the Contractor by excavation where the pipe has been covered with backfill. Should the leakage test results exceed allowable leakage, the test pressure shall be maintained for an additional period of time as directed by the Engineer to facilitate location of leaks.
5. All pipe, fittings, valves, pipe joints, and other materials which are found to be defective when the pipe line is tested shall be removed from the line immediately and replaced with new and acceptable material by and at the expense of the Contractor. The pressure test shall be repeated after repairing leaks and other defective work until the pipe line installation conforms to specified requirements and is accepted by the Engineer.

D. Air Leakage Test:

1. Contractor shall perform air tests for all pipe sizes.
2. Air leakage testing shall be performed on lies as specified and on the following lines:
    a. Outfall line
    b. Drain lines
    c. Sanitary sewer lines
3. Furnish all facilities required including necessary piping connections, test pumping equipment, pressure gauges, bulkheads, regulator to avoid over-pressurization, and all miscellaneous items required.
    a. The pipe plug for introducing air in to the line shall be equipped with two taps. One tap will be used to introduce air into the line being tested, through suitable valves and fittings, so that the input air may be regulated. The second tap will be fitted with valves and fitting to accept a pressure test gauge indicating internal pressure in the sewer pipe. An additional valve and fitting will be incorporated on the tap used to check internal pressure so that a second test gauge may be attached to the internal pressure tap. The pressure test gauge will also be used to indicate loss of air pressure due to leaks in the sewer line.
    b. The pressure test gauge shall meet the following minimum specifications:
        i. Size (diameter) 4-1/2 inches
        ii. Pressure Range 0-15 psi
        iii. Figure Intervals 1 psi increments
        iv. Minor Subdivisions 0.05 psi
        v. Pressure Tube Burdon Tube or diaphragm

	Accuracy	+ 0.25% of maximum scale reading
vi.	Dial	White coated aluminum with black lettering, 270 degrees arc and mirror edge
vii.	Pipe Connection	Low male 1/2 inch NPT

Calibration data will be supplied with all pressure test gauges. Certification of pressure test gauge will be required from the gauge manufacturer. This certification and calibration data will be available to the Engineer whenever air test are performed.

4. Test each reach of sewer pipe between manholes after completion of the installation of pipe and appurtenances and the backfill of sewer trench.
5. Plug ends of line and cap or plug all connections to withstand internal pressure. One of the plugs provided must have two taps for connecting equipment. After connecting air control equipment to the air hose, monitor air pressure so that internal pressure does not exceed 5.0 psig. After reaching 4.0 psig, throttle the air supply to maintain between 4.0 and 3.5 psig for at least two (2) minutes in order to allow equilibrium between air temperature and pipe walls. During this time, check all plugs to detect any leakage. If plugs are found to leak, bleed off air, tighten plugs, and again begin supplying air. After temperature has stabilized, the pressure is allowed to decrease to 3.5 psig. At 3.5 psig, begin timing to determine the time required for pressure to drop to 2.5 psig. If the time, in seconds, for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than shown in the table below, the pipe shall be presumed to be free of defects.

Minimum Specified Time Required for a 1.0 psig Pressure Drop for Size and Length of Pipe Indicated for Q=0.0015
(ASTM F 1417, Table 1)

Pipe Diameter, in.	Minimum Time, min:s	Length for Minimum Time, ft	Time for Longer Length, s	Specification Time for Length (L) Shown, min:s							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 t
4	3:46	597	0.380L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

If air test fails to meet above requirements, repeat test as necessary after all leaks and defects have been repaired. Prior to acceptance, all constructed sewer lines shall satisfactorily pass the pressure air test.

6. In areas where ground water is known to exist, install a one-half inch diameter capped pipe nipple approximately 10 inches long, through manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the line acceptance test, ground water level shall be determined by removing pipe cap, blowing air through pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to pipe nipple. The hose shall be held vertically and a measurement of height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings.

E. Deflection Tests:

1. Deflection tests shall be performed on all flexible sewer pipe by the Contractor using a mandrel pull. The mandrel shall have not less than seven (7) arms. The mandrel pull cannot be performed any sooner than 30 days after the reach being tested has been installed and final backfill has been placed.
2. A section of sewer line reach shall be deemed as failed when the mandrel cannot be moved through it with reasonable force. The tests shall be performed without mechanical pulling devices.
3. At the conclusion of the mandrel pull, the Contractor, at his expense, shall be required to remove and replace all pipe which fails the test.
4. The mandrel diameter shall be based on 95 percent of the actual inside pipe diameter.

F. Alignment Tests:

1. At the Owner’s or Engineer’s instruction the Contractor shall check the alignment of a sewer line using either a laser beam or lamping methods.

END OF SECTION 333100

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: construction of storm sewer piping as indicated on the project drawings.

1.2 RELATED SECTIONS

A. Section 312300 Excavation and Fill for trenching, bedding, and backfill requirements.

B. Section 334900 Storm Drainage Structures for storm drainage system structure requirements.

1.3 SUBMITTALS

A. Product Data for the following:

1. Pipe, flared-end sections, and other storm water piping accessories.

1.4 QUALITY ASSURANCE

A. Applicable Standards:

1.	AASHTO M 294	High Density Polyethylene Pipe
2.	AASHTO M 36	Aluminized Steel
3.	AASHTO M 274	Aluminized Steel
4.	ASTM A 760	Pipe and Coupling Bands
5.	ASTM C 76	Concrete Pipe and Testing
6.	ASTM C 497	Concrete Pipe and Testing

PART 2 – PRODUCTS

2.1 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

A. High density polyethylene pipe shall conform with AASHTO M 294, type S (non-perforated circular cross section with corrugated outer surface and a smooth inner surface) for pipe diameters of 15 inches to 60 inches, inclusive.

B. Joints may be either bell-and-spigot, gasketed joints or made with external coupling bands. Joint integrity shall conform to the performance requirements of AASHTO M 294. Joints shall be soil tight.

C. Fittings and coupling bands shall be fabricated from the same material as the pipe and shall prevent the infiltration of soil into the pipe.

D. Coupling bands shall cover at least two full corrugations on each section of pipe and shall prevent the infiltration of soil into the pipe.

E. HPDE Flared end sections shall not be permitted on the Project.

2.2 CORRUGATED METAL PIPE (ALUMINIZED)

A. Pipe shall conform to AASHTO M 36 and M 274.

B. Pipe shall be Type 2 Aluminized Steel with manning's n value no greater than 0.013.

C. Metal end sections shall be galvanized (AASHTO M 218) meal with toe plates.

D. Pipe shall be of size, length and gauge thickness as indicated.

E. Pipe and coupling bands shall conform to ASTM A 760/A 760M.

2.3 REINFORCED CONCRETE PIPE (RCP)

A. Materials for reinforced concrete pipes shall be supplied, fabricated, and tested in accordance with the latest edition of ASTM C 76 and all other related specifications noted therein.

PART 3 – EXECUTION

3.1 TRENCHING AND BACKFILLING

A. Contractor shall perform trenching and backfilling for storm water piping as specified in Section 31 23 00 Excavation and Fill, and as indicated on the project drawings.

3.2 PIPE INSTALLATION

A. General: All pipe shall be carefully laid true to lines and grades indicated. Any pipe which is not in true alignment or which shows undue settlement after laying shall be taken up and relayed at the Contractor's expense.

B. High Density Polyethylene (HDPE) Pipe and Corrugated Metal Pipe (CMP):

1. Install to conform to manufacturer's recommendations.
2. Lift or roll pipe to protect coating. Do not drag over gravel or rock. Avoid striking rocks or hard objects when lowering into trench. Pipe on which coatings have been damaged may be rejected at the site of the work regardless of previous approvals.
3. Join pipe sections with firmly bolted coupling bands of the same material.
4. All pipe shall have end sections compatible with the pipe which provides a smooth invert.

C. Reinforced Concrete Pipe (RCP):

1. Install to conform to manufacturer's recommendations.
2. Joints may be one of the following:
    a. Flexible Neoprene Gaskets of the proper size conforming to the requirements of ASTM C 443.
    b. Bituminous Mastic Joint Compound. This compound shall be a homogeneous blend of bituminous material, inert filler, and suitable

solvents or plasticizing compounds thoroughly mixed at the factory to a uniform consistency.

3.3 CLEAN-UP

A. Upon completion of work, remove forms, equipment, protective covering, and rubbish from premises. Carefully clean interior of storm water piping of dirt, rubbish, and surplus mortar and leave clean and smooth upon completion of the project.

END OF SECTION 334100

SECTION 33 41 00 - SUBDRAINAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Building Perimeter and Retaining Wall Drainage Systems.

1.2 SUBMITTALS

A. Product Data: Provide data on pipe drainage products, pipe accessories, and geotextile filter fabrics.

PART 2 PRODUCTS

2.1 PIPE MATERIALS

A. Polyvinyl Chloride Pipe: ASTM D2729; plain end, 4 inch inside diameter; with required fittings.

B. Use perforated pipe at subdrainage system; unperforated through sleeved walls.

1. NPS 6 and Smaller: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
2. Couplings: Manufacturer's standard, band type.

C. Geotextile Filter Fabrics: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.

1. Structure Type: Nonwoven, needle-punched continuous filament.
   a. Survivability: AASHTO M 288 Class 2
   b. Styles: Flat and sock.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

3.2 INSTALLATION

A. Install and join pipe and pipe fittings in accordance with pipe manufacturer's instructions.

B. Place drainage pipe on clean cut subsoil.

C. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Loosely butt pipe ends. Place joint cover strip 12 inches wide, around pipe diameter centered over joint.

E. Place pipe with perforations facing down. Mechanically join pipe ends.

F. Install filter aggregate at sides, over joint covers and top of pipe. Provide top cover compacted thickness of 12 inches.

G. Place filter fabric over levelled top surface of aggregate cover prior to subsequent backfilling operations.

H. Place aggregate in maximum 4 inch lifts, consolidating each lift.

I. Place impervious fill over drainage pipe aggregate cover and compact.

J. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

K. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

L. Install thermoplastic piping according to ASTM D 2321.

END OF SECTION

SECTION 334900 - STORM DRAINAGE STRUCTURES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: requirements and specifications necessary for construction of storm sewer structures as indicated on the project drawings.

B. Provide construction staking in accordance with generally accepted practice for layout of underground utilities.

1.2 RELATED SECTIONS

A. Section 312300 Excavation and Fill for trenching, bedding, and backfill requirements.

B. Section 321313 Concrete Paving for concrete material and mixture requirements.

C. Section 334100 Storm Utility Drainage Piping for storm drainage system piping requirements.

1.3 SUBMITTALS

A. Product Data for the following:

1. Manhole frames and covers

B. Shop Drawings: Include plans, elevations, details, and attachments for precast concrete drainage structures, including frame and covers.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Handle precast concrete drainage structures according to manufacturer's written rigging instructions.

PART 2 – PRODUCTS

2.1 PRECAST REINFORCED CONCRETE STRUCTURES

A. Construction of precast reinforced concrete structures shall be in conformance with ASTM C 478.

B. Concrete materials and mix design requirements shall be in conformance with Section 321313 Concrete Paving.

C. Reinforcement shall be in accordance with the project drawings and in conformance with Section 321313 Concrete Paving.

2.2 PVC/HDPE STRUCTURES

A. PVC or HDPE structures shall be Nyloplast® Engineered Drainage Structures or approved equal.

PART 3 – EXECUTION

3.1 EXCAVATION AND BACKFILLING

A. Contractor shall perform excavation and backfilling for storm water structures as specified in Section 312300 Excavation and Fill, and as indicated on the project drawings.

3.2 STRUCTURE INSTALLATION

A. General: All structures shall be carefully installed true to lines and grades indicated. Any structure which is not in true alignment or which shows undue settlement after installation shall be removed and reinstalled at the Contractor's expense.

B. Precast reinforced concrete structures:

1. Handle and place precast concrete drainage structures according to manufacturer's written rigging instructions.
2. Floor of structure shall be cast-in-place; concrete used shall comply with Section 321313 Concrete Paving.
3. All joints shall receive mastic joint sealant, RAM-NEK or approved equal.

C. PVC/HDPE Structures

1. Installation shall be in conformance with manufacturer's installation instructions.

3.3 CLEAN-UP

A. Upon completion of work, remove forms, equipment, protective covering, and rubbish from premises. Carefully clean interior of storm water structures of dirt, rubbish, and surplus mortar and leave clean and smooth upon completion of the project.

END OF SECTION 334900

APPENDIX A:
BID DOCUMENTS

Advancement of Construction Technology

SUBSTITUTION REQUEST

(During the Bidding Phase)

Project _____

_____

To: _____

_____

Re: _____

Substitution Request Number: N/A

From: _____

Date: _____

A/E Project Number: _____

Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____ ***Signature required***

Firm: _____

Address: _____

_____

Telephone: _____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

Advancement of Construction Technology

SUBSTITUTION REQUEST
(After the Bidding Phase)

Project: _____

_____

_____

To: Paragon Architecture

_____

_____

Re:

Substitution Request Number: N/A

From: _____

Date: _____

A/E Project Number: _____

Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

☐ Point-by-point comparative data attached - REQUIRED BY Fill in if required

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

Savings to Owner for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☑ Drawings ☑ Product Data ☐ Samples ☑ Tests ☑ Reports ☐ _____

SUBSTITUTION REQUEST
(Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

_____

_____

_____

_____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____

_____

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Geotechnical Engineering Report

Barry-Lawrence Regional Library
Monett, Missouri
January 29, 2021
Terracon Project No. B5205071

Prepared for:
Paragon Architecture, LLC
Springfield, Missouri

Prepared by:
Terracon Consultants, Inc.
Springfield, Missouri

January 29, 2021

Paragon Architecture, LLC
637 W. College Street
Springfield, Missouri 65806

Attn: Mr. Brad Erwin, AIA
P: (417) 885-0002
E: erwin@paragonarchitecture.com

Re: Geotechnical Engineering Report
Barry-Lawrence Regional Library
1000 Old Airport Road
Monett, Missouri
Terracon Project No. B5205071

Dear Mr. Erwin:

We have completed the Geotechnical Engineering services for the above-referenced project. This study was performed in general accordance with Terracon Proposal No. PB5205071, dated November 3, 2020 and authorized on November 30, 2020. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs, and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

STATE OF MISSOURI
ALLEN
G. MINKS
NUMBER
E-22438
REGISTERED PROFESSIONAL ENGINEER

Jessica M. Cannon, E.I.
Staff Geotechnical Engineer

Allen G. Minks, P.E.
Senior Consultant
Missouri No. E-22438
Renews:12/31/2021

1-29-21

REPORT TOPICS

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

REPORT SUMMARY

Topic [1]	Overview Statement [2]
Project Description	Ten (10) borings were advanced to depths of 10 to 35 feet in order to obtain geotechnical engineering data for the proposed Barry-Lawrence Regional Library and associated pavements.
Geotechnical Characterization	Fat clay, lean clay, and clayey gravel were encountered in all of our borings. Groundwater was not encountered.
Earthwork	**Expansive Soils**: The fat clay soils encountered in the borings are very high in plasticity and prone to volume change with variations in moisture content. For this reason, we recommend that at least the upper 36, 24, and 12 inches of soil below the bottom of the floor slab level, foundations, and pavement base rock, respectively, consist of low plasticity (LP) material as defined in the **Earthwork** section. Existing lean clays can be used for engineered fill Clays are sensitive to moisture variation
Shallow Foundations	Allowable bearing pressure = 2,500 psf Expected settlements: less than 1 inch total, less than ¾ inch differential.
Seismic Considerations	International Building Code Site Class (IBC): D
Below-Grade Structures	Retaining Walls: None anticipated Basements: None anticipated
Pavements	With subgrade prepared as noted in **Earthwork** Concrete: ■ 5 inches PCC over 4 inches in light-duty areas ■ 6 inches PCC over 4 inches in medium-duty areas Asphalt: ■ 3 inches ACC over 8 inches granular base in light-duty areas ■ 5 inches ACC over 8 inches granular base in medium-duty areas
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report.

Geotechnical Engineering Report

Barry-Lawrence Regional Library
1000 Old Airport Road
Monett, Missouri

Terracon Project No. B5205071
January 29, 2021

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed library to be located at 1000 Old Airport Road in Monett, Missouri. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Excavation considerations
- Foundation design and construction
- Floor slab design and construction
- Seismic site classification per IBC
- Lateral earth pressures
- Pavement design and construction

The geotechnical engineering scope of services for this project included the advancement of ten (10) soil borings to depths ranging from approximately 10 to 35 feet below existing site grades.

Maps showing the site and boring locations are included in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs in the **Exploration Results** section of this report.

The **General Comments** section provides an understanding of the report limitations.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at 100 Old Airport Road in Monett, Missouri. Latitude: 36.9302°N Longitude: 93.9020°W See **Site Location**
Existing Improvements	Undeveloped

Item	Description
Current Ground Cover	Lightly-vegetated
Existing Topography	Relatively flat
Geology	Based on the Geological Map provided by the United States Geologic Survey (USGS), the subject site is located over the Osagean Series. The Osagean Series consists of limestone bedrock with smaller amounts of chert, dolomite, and shale.
Solution Features	Solution features, including springs, caves, and sinkholes, are commonly present in the bedrock formations in this area. Based on the review of information available from MDNR, the subject site does not contain any previously identified sinkhole formations. However, there are sinkholes less than 1 mile south of the project site. See **Solution Features** Map. It is difficult to predict future sinkhole activity. Site grading and drainage may alter site conditions and could possibly cause sinkholes in areas that have no history of this activity.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed in the project planning stage. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Information was provided by Mr. Brad Erwin, AIA with Paragon
Project Description	New library facility
Proposed Structures	The project includes a single-story, slab-on-grade, building with an approximate footprint of 20,400 square feet.
Finished Floor Elevation	Within 10 feet of existing grade
Maximum Loads (estimated by Terracon)	■ Columns: 120 kips ■ Walls: 3-5 kips per linear foot (klf) ■ Slabs: 150 pounds per square foot (psf)
Grading/Slopes	Grading plans were not provided, but we assume up to 10 feet of cut and/or fill may be required to develop final grades. Final slope angles no steeper than 3H:1V (Horizontal: Vertical) are expected.
Below-Grade Structures	None anticipated

Item	Description
Free-Standing Retaining Walls	Retaining walls are expected to be constructed near the proposed building footprint as part of site development to achieve final grades. Wall heights of up to 10 feet are anticipated. If retaining walls will be located more than 50 feet from the proposed building footprint, Terracon should be notified immediately to provide a supplemental agreement for additional borings and analysis.
Pavements	We assume both rigid (concrete) and flexible (asphalt) pavement sections should be considered. Anticipated traffic is as follows: ■ Autos/light trucks: 300 vehicles per day ■ Light delivery and trash collection vehicles: less than 5 vehicles per week ■ Tractor-trailer trucks: Not anticipated The pavement design period is 20 years.

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, and geologic setting. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs and GeoModel can be found in the **Exploration Results** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Granular**	Clayey gravel (GC)
2	**Fat Clay**	Gravelly fat clay (CH) and fat clay (CH) with trace amounts of gravel
3	**Lean Clay**	Gravelly lean clay (CL)

The boreholes were observed while drilling and after completion for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in **Exploration Results**. Groundwater was not encountered during or immediately after drilling operations. This does not necessarily mean the borings terminated above groundwater. Due to the low permeability of the soils encountered in the borings, a relatively long period of time may be necessary for a groundwater level to develop and stabilize in a borehole. Long-term observations in

piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels in materials of this type.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be different from the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

Expansive Soils

The fat clay (CH) soils encountered in the borings are very high in plasticity (PI≥40) and prone to volume change with variations in moisture content. For this reason, we recommend that at least the upper 36, 24, and 12 inches of soil below the bottom of the floor slab level in the building footprint, foundations, and the pavement base rock, respectively, consist of low plasticity (LP) material as defined in the **Earthwork** section.

This LP layer should also be confirmed or placed below other flatwork abutting the structure. The procedures recommended in this report may not eliminate all future subgrade volume change and resultant movements. However, the procedures outlined should reduce the potential for subgrade volume change. Additional reductions in subgrade movements could be achieved by using a thicker LP zone. LP material may need to be imported.

This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. However, even if these procedures are followed, some movement and at least minor cracking in the structure could still occur. The severity of cracking and other cosmetic damage such as uneven floor slabs on grade will likely increase if any modification of the site results in excessive wetting or drying of the expansive soils. Eliminating the risk of movement and cosmetic distress may not be feasible, but it may be possible to further reduce the risk of movement if more extensive measures are used during construction. We would be pleased to discuss other construction alternatives with you upon request.

Pavements may be somewhat more tolerant of shrink and swell characteristics of high plasticity soil subgrade conditions. Even so, we recommend that at least the upper 12 inches of pavement subgrade be constructed of engineered LP material, or the soils be chemically modified to reduce their volume change susceptibility.

Soft Subgrade

The near surface soils consist of clays and gravel which could become unstable with typical earthwork and construction traffic, especially after precipitation events. Even in dry weather, a granular subgrade is subject to loss of strength from disturbance. Effective drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. If possible, the grading should be performed during the warmer and drier times of the year. If grading is performed during the wetter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in the **Earthwork** section.

EARTHWORK

Site Preparation

Prior to placing fill, existing vegetation and root mat should be removed. Complete stripping of the topsoil should be performed in the proposed building and pavement areas.

The subgrade should be proofrolled with an adequately loaded vehicle such as a fully-loaded, tandem-axle dump truck in areas of cohesive soil or with a vibratory roller in areas of granular material. The proofrolling should be observed by the Geotechnical Engineer. Areas excessively deflecting under the proofroll should be delineated and subsequently addressed by the Geotechnical Engineer. Excessively wet or dry material should either be removed or moisture conditioned and recompacted.

Subgrade Stabilization

Methods of subgrade improvement, as described below, could include scarification, moisture conditioning and recompaction, or removal of unstable materials and replacement with granular fill (with or without geosynthetics). The appropriate method of improvement, if required, would be dependent on factors such as schedule, weather, the size of the area to be stabilized, and the nature of the instability. More detailed recommendations can be provided during construction as the need for subgrade stabilization occurs. Performing site grading operations during warm seasons and dry periods would help to reduce the amount of subgrade stabilization required.

If the exposed subgrade is unstable during proofrolling operations, it could be stabilized using one of the methods outlined below.

- **Scarification and Compaction** – It may be feasible to scarify, dry, and recompact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Stable subgrades likely would not be achievable if the thickness of the unstable soil is greater than about 1 foot, if the unstable soil is at or near

groundwater levels, or if construction is performed during a period of wet or cool weather when drying is difficult.

- **Crushed Stone** – The use of crushed stone or gravel is the most common procedure to improve subgrade stability. Typical undercut depths would be expected to range from about 6 to 30 inches below finished subgrade elevation with this procedure. The use of high modulus geotextiles (i.e., engineering fabric or geogrid) could also be considered after underground work, such as utility construction, is completed. Prior to placing the fabric or geogrid, we recommend that all below-grade construction, such as utility line installation, be completed to avoid damaging the fabric or geogrid. Equipment should not be operated above the fabric or geogrid until one full lift of crushed stone fill is placed above it. The maximum particle size of granular material placed over geotextile fabric or geogrid should meet the manufacturer's specifications, and generally should not exceed 1½ inches.

Further evaluation of the need and recommendations for subgrade stabilization can be provided during construction as the geotechnical conditions are exposed.

Fill Material Types

Compacted structural fill should meet the following material property requirements:

Fill Type [1]	USCS Classification	Acceptable Location for Placement
High Plasticity Material	CH (LL≥70 or PI≥40)	Below upper 3 feet of floors and other lightly-loaded structures; 2 feet of foundations; and 1 foot of pavement base rock
Moderate to High Plasticity Material [2]	CH or CL, with 70>LL≥45 or 40>PI≥25	Below upper 2 feet of floor slabs and any other lightly-loaded structures, below upper 1 foot of pavement base rock
Granular Material [3]	GM, GC, SM, or SC	All locations and elevations
Low Plasticity (LP) Material [4]	CL (LL<45 & PI<25) or Granular Material [3]	

1. Compacted structural fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to Terracon for evaluation. On-site soils generally appear suitable for use as fill outside of the LP zone.
2. Delineation of moderate to high plasticity clays should be performed in the field by the Geotechnical Engineer or their representative, and could require additional laboratory testing. If fat clay material contains greater than 35 percent granular material retained on a ¾-inch sieve, it may be used in the low volume change zone.
3. Crushed limestone aggregate, limestone screenings or granular material such as sand, gravel or crushed stone containing at least 15 percent low plasticity fines.
4. Low plasticity cohesive soil or granular soil having low plasticity fines. Material should be approved by the Geotechnical Engineer.

Fill Compaction Requirements

Item	Description
Fill Lift Thickness	9 inches or less in loose thickness for heavy compaction equipment 4 to 6 inches or less in loose thickness for light, hand-operated compaction equipment
Compaction Requirements [1]	At least 95 percent of the material's maximum standard Proctor dry density for cohesive soils and at least 70 percent relative density for granular materials
Moisture Content – Cohesive Soil	Low plasticity cohesive: -2 percent to +2 percent of the optimum moisture content value as determined by the standard Proctor test High plasticity cohesive: 0 to +4 percent of the optimum moisture content value as determined by the standard Proctor test
Moisture Content – Granular Material	Workable moisture levels [2]

1. We recommend that engineered fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested until the specified moisture and compaction requirements are achieved. As stated within ASTM D 698, this procedure is intended for soils with 30 percent or less material larger than ¾ inch. Accordingly, we recommend full time proofroll observation be performed instead of moisture density testing for materials containing more than 30 percent aggregate retained on the ¾-inch sieve.
2. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proofrolled.

Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. If utility trenches in cohesive soils are backfilled with relatively clean granular material, they should be capped with at least 18 inches of cohesive fill in non-pavement areas to reduce the infiltration and conveyance of surface water through the trench backfill.

Utility trenches are a common source of water infiltration and migration. All utility trenches in cohesive soils that penetrate beneath buildings should be effectively sealed to restrict water intrusion and flow through the trenches that could migrate below the structure. We recommend constructing an effective clay "trench plug" that extends at least 5 feet out from the face of the structure exterior. The plug material should consist of lean clay compacted at a water content at or above the soil's optimum water content. The lean clay fill should be placed to completely surround the utility line and be compacted in accordance with the recommendations in this report.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. These greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5 percent away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping, final grades should be checked to document that effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure a maintenance program should be established to effectively seal and maintain joints to resist surface water infiltration.

Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade water content. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Any water that collects over, or adjacent to, construction areas should be promptly removed. If the subgrade freezes, or becomes excessively wet or dry, or is disturbed, the affected material should be removed, or these materials should be scarified, moisture conditioned, and recompacted, prior to further construction. All of these processes should be observed by Terracon.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming any responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The Geotechnical Engineer should be retained during the construction phase of the project to observe earthwork and to perform tests and observations during subgrade preparation,

proofrolling, placement and compaction of controlled compacted fills, backfilling of excavations into the completed subgrade, and just prior to construction of slabs.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations. At least 2 feet of LP material should be placed directly beneath the foundation bottom.

Design Parameters – Compressive Loads

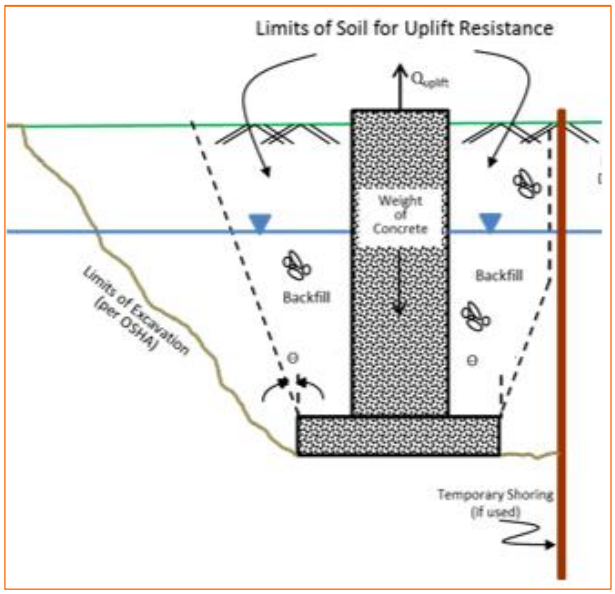
Item	Description
Maximum net allowable bearing pressure [1, 2]	2,500 psf
Required bearing stratum [3]	24 inches of LP material over native soils or newly placed compacted structural fill extending down to native soils
Minimum foundation dimensions	Columns: 30 inches Continuous: 18 inches
Ultimate passive resistance [4] (equivalent fluid pressures)	250 pcf (LP clay) 300 psf (gravel)
Ultimate coefficient of sliding friction [5]	0.30 (LP clay) 0.40 (gravel)
Minimum embedment below finished grade [6]	30 inches
Estimated total settlement from structural loads [2]	Less than about 1 inch
Estimated differential settlement [2, 7]	About ¾ of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. A factor of safety of 3 has been applied. These bearing pressures can be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions. Values assume that exterior grades are no steeper than 20 percent within 10 feet of the structure.
2. Values provided are for the maximum loads noted in **Project Description**.
3. Unsuitable or soft soils should be overexcavated and replaced according to the recommendations presented in **Earthwork**.
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions. Should be neglected if passive pressure is used to resist lateral loads.

6. Embedment necessary to resist the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
7. Differential settlements are as measured over a span of up to 50 feet.

Design Parameters - Uplift Loads

Uplift resistance of spread footings can be developed from the effective weight of the footing and the overlying soils. As illustrated on the subsequent figure, the effective weight of the soil prism defined by diagonal planes extending up from the top of the perimeter of the foundation to the ground surface at an angle, q, of 20 degrees from the vertical can be included in uplift resistance. The maximum allowable uplift capacity should be taken as a sum of the effective weight of soil plus the dead weight of the foundation, divided by an appropriate factor of safety. A maximum total unit weight of 120 pcf should be used for the backfill. This unit weight should be reduced to 60 pcf for portions of the backfill or natural soils below the groundwater elevation.



Foundation Construction Considerations

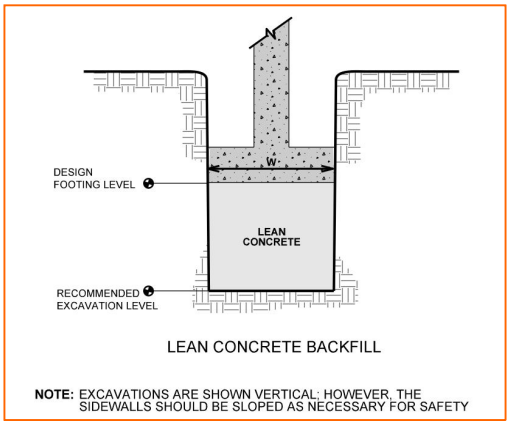
Due to the gravelly nature of some of the subsurface soils, excavations may not stand vertically and the foundations may need to be formed. We recommend that a walk-behind or backhoe-mounted vibratory plate be used to densify the footing subgrade after excavation.

As noted in **Earthwork**, the footing excavations should be evaluated by the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the

footing excavations should be removed/reconditioned before foundation concrete is placed. Placement of a lean concrete mud-mat over the bearing soils should be considered if the excavations must remain open for an extended period of time.

Although groundwater was not encountered in the borings at depths expected to affect foundation excavations, it could still be encountered during foundation excavations or in other excavation activities. In addition, some surface and/or perched groundwater may enter foundation excavations during construction. It is anticipated that any water entering foundation excavations from these sources can be removed using sump pumps or gravity drainage. Additional dewatering efforts may be required if greater inflow occurs.

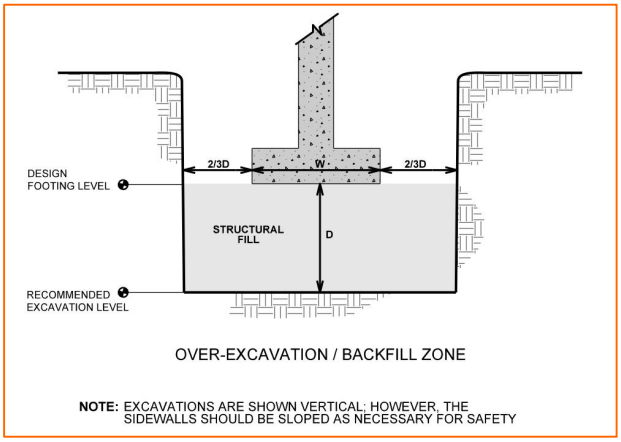
If unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils. The footings could then bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. This is illustrated on the sketch below.



LEAN CONCRETE BACKFILL

NOTE: EXCAVATIONS ARE SHOWN VERTICAL; HOWEVER, THE SIDEWALLS SHOULD BE SLOPED AS NECESSARY FOR SAFETY

As an alternative, the footings could also bear on properly compacted structural backfill extending down to suitable soils. Overexcavation for compacted structural fill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. Overexcavation for structural fill placement below footings should be conducted as shown below. The overexcavation should be backfilled up to the footing base elevation as recommended in the **Earthwork** section.



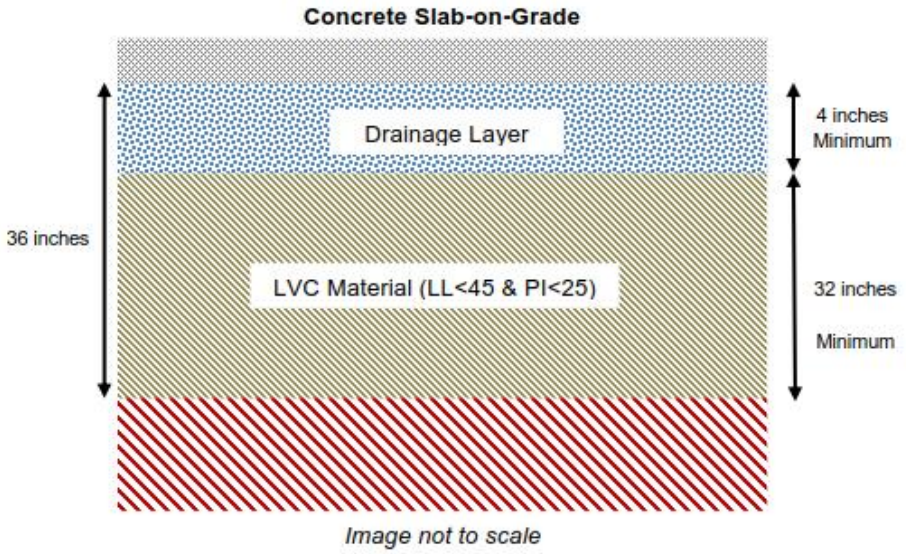
It is emphasized that difficulty may be experienced with trying to extend foundation excavations deeper into the gravelly materials.

SEISMIC CONSIDERATIONS

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Class is required to determine the Seismic Design Category for a structure. The Site Class is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7-10. Based on the soil/bedrock properties encountered at the site and as described on the boring logs, the **Seismic Site Class is D**. Borings at this site were extended to a maximum depth of 35 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

FLOOR SLABS

The subgrade soils include moderate to very high plasticity clays, and these soils exhibit the potential to swell with increased water content. Construction of the floor slab, combined with revising site drainage creates the potential for gradual increased water contents within the clays. Increases in water content could cause the clays to swell and damage the floor slab. To reduce the swell potential, we recommend that at least the upper 36 inches of materials below the floor slab be an approved Low Plasticity (LP) material.



Design parameters for floor slabs assume that the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure. This also includes positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor slab support [1]	Minimum 4 inches of free-draining (less than 5 percent passing the U.S. No. 200 sieve) crushed aggregate compacted to at least 95 percent of ASTM D 698 [2,3] over at least 32 inches of low plasticity cohesive or granular soils with at least 15 percent passing the U.S. No. 200 sieve
Estimated modulus of subgrade reaction [2]	150 pounds per square inch per inch (psi/in) for point loads.

1. Floor slabs should be structurally independent of any building footings or walls to reduce the potential of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table, including the 36-inch thick LP layer. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.
3. Other design considerations, such as cold temperatures and condensation development, could warrant more extensive design provisions.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or any cracks that develop should be sealed with a waterproof, nonextruding compressible compound specifically recommended for heavy-duty concrete and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing, or other means.

Floor Slab Construction Considerations

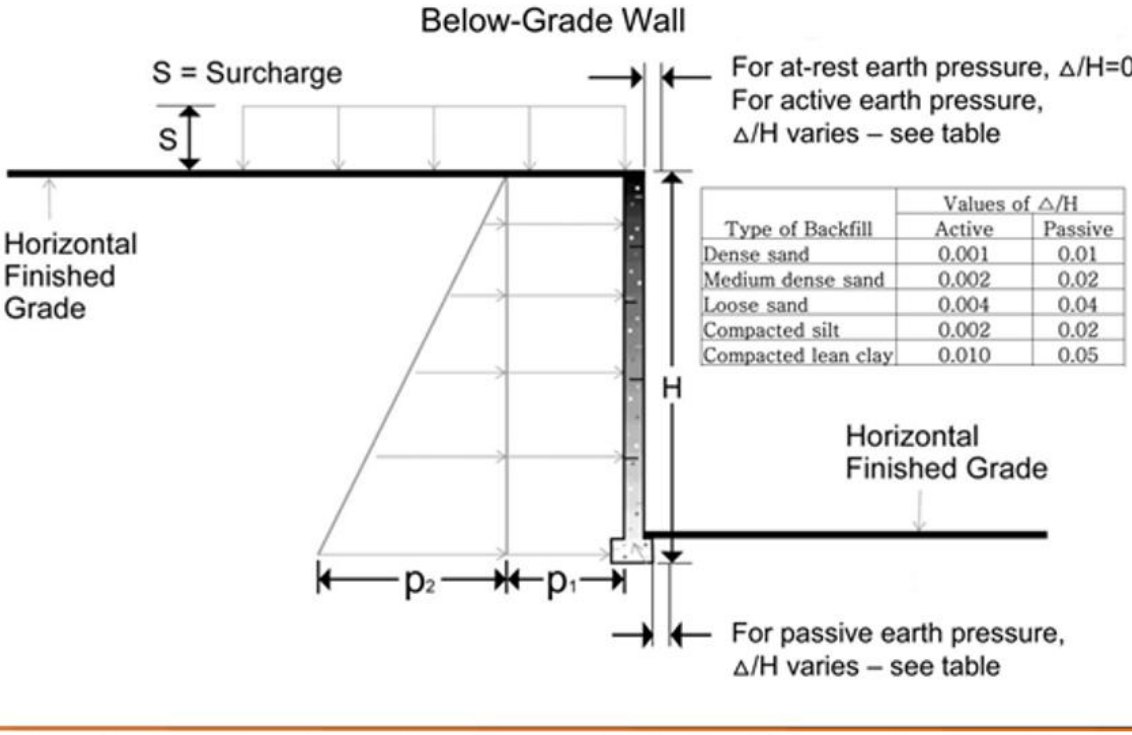
Finished subgrade within and for at least 10 feet beyond the floor slab should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become excessively wet or dry, or damaged prior to construction of floor slabs, the affected material should be removed and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

LATERAL EARTH PRESSURES

Lateral Earth Pressure Design Parameters

Rigid below-grade structures with unbalanced backfill levels on opposite sides, such as reinforced concrete walls, should be designed for earth pressures at least equal to those indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction, and the strength of the materials being restrained. Two wall restraint conditions are shown. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement and is commonly used for basement walls, loading dock walls, or other walls restrained at the top. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls (unless stated). *These earth pressures do not apply to mechanically stabilized earth (MSE) or segmental retaining walls.*



Type of Backfill	Values of Δ/H	
	Active	Passive
Dense sand	0.001	0.01
Medium dense sand	0.002	0.02
Loose sand	0.004	0.04
Compacted silt	0.002	0.02
Compacted lean clay	0.010	0.05

Table from Movements Required to Reach Active or Passive Earth Pressure Conditions (Clough and Duncan, 1991)

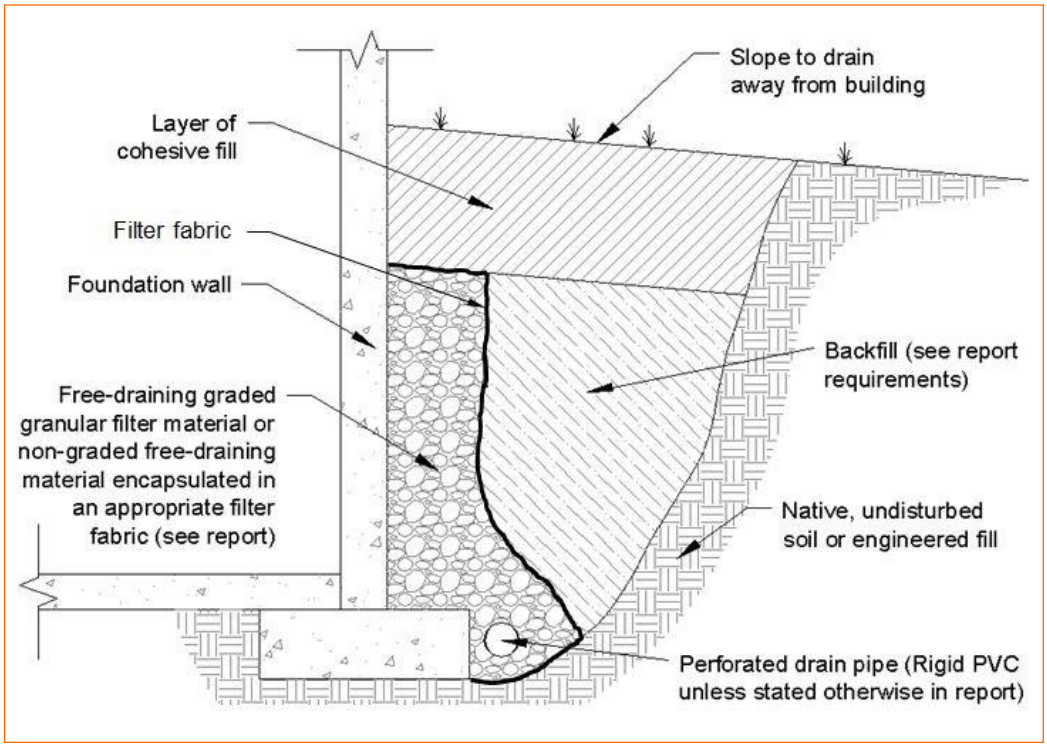
Lateral Earth Pressure Design Parameters					
Earth Pressure Condition [1]	Coefficient for Backfill Type	Minimum Φ Angle (degrees)	Equivalent Fluid Density (pcf)	Surcharge Pressure, p_1 (psf)	Earth Pressure, p_2 (psf)
Active (K_a)	Granular - 0.33	30	40	(0.33)S	(40)H
	Lean Clay - 0.39	25	50	(0.39)S	(50)H
At-Rest (K_o)	Granular - 0.50	30	60	(0.50)S	(60)H
	Lean Clay - 0.56	25	70	(0.56)S	(70)H
Passive (K_p)	Granular - 3.0	30	360	---	---
	Lean Clay - 2.5	25	300	---	---

Applicable conditions to the above include:

- For active earth pressure, wall must rotate about the base, with top lateral movements as indicated in the above tables
- For passive earth pressure to develop, wall must move horizontally to mobilize resistance as indicated in the above tables
- Uniform surcharge, where S is surcharge pressure
- Horizontal backfill, compacted at 95 to 98 percent of its standard Proctor maximum dry density
- Loading from heavy compaction equipment is not included
- No hydrostatic pressures acting on wall
- No dynamic loading
- No safety factor included in soil parameters
- Ignore passive pressure in frost zone

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils (i.e., fat clay is not acceptable backfill material). For the granular values to be valid, the granular backfill must extend out from the base of the wall at an angle of at least 45, 45 and 60 degrees from vertical for the active, at-rest and passive cases, respectively. To calculate the resistance to sliding, a value of 0.30 should be used as the ultimate coefficient of friction between the footing and underlying cohesive soil, or 0.40 as the ultimate coefficient of friction between the footing and underlying gravel.

A perforated rigid plastic or metal drain line installed behind the base of walls that extend below adjacent grade is recommended to limit hydrostatic loading on the walls. The invert of a drain line around a below-grade wall should be placed near foundation bearing level. The drain line should be sloped to provide positive gravity drainage or to a sump pit and pump. The drain line should be surrounded by clean, free-draining granular material having less than 5 percent (by weight) passing the U.S. No. 200 sieve. The free-draining aggregate should be encapsulated in a filter fabric. The granular fill should extend to within 2 feet of final grade, where it should be capped with compacted cohesive fill to reduce infiltration of surface water into the drain system.



As an alternative to free-draining granular fill, a pre-fabricated drainage composite may be used. A pre-fabricated drainage composite is a plastic drainage core or mesh which is covered with filter fabric to resist soil intrusion, and fastened to the wall prior to placing backfill.

If controlling hydrostatic pressure behind the wall as described above is not possible, then combined hydrostatic and lateral earth pressures should be calculated for lean clay backfill using an equivalent fluid weighing 90 and 100 pcf for active and at-rest conditions, respectively. For granular backfill, an equivalent fluid weighing 85 and 90 pcf should be used for active and at-rest, respectively. These pressures do not include the influence of surcharge, equipment or pavement loading, which should be added. Heavy equipment should not operate within a horizontal distance closer than the exposed height of retaining walls to avoid lateral pressures greater than those provided.

PAVEMENTS

General Pavement Comments

Pavement designs are provided for the pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs, as noted in this section, are applicable if the site has been prepared as recommended in the **Site Preparation** section.

Pavements are typically more tolerant of non-uniform subgrade conditions than foundations and floor slabs. As discussed in **Expansive Soils**, we recommend at least 12 inches of LP material beneath the pavement base rock to reduce the shrink/swell potential of the subgrade. Support characteristics of subgrade for pavement design do not account for shrink/swell movements of an expansive clay subgrade, such as the soils encountered on this site. Thus, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade.

Pavement Subgrade Preparation

On most projects, the site grading is accomplished relatively early in the construction phase. Fills are placed and compacted in a uniform manner. However, as construction proceeds, excavations are made into these areas, rainfall and surface water saturate some areas, heavy traffic from concrete trucks and other delivery vehicles disturbs the subgrade and many surface irregularities are filled in with loose soils to improve stability temporarily. As a result, the pavement subgrades, initially prepared early in the project, should be carefully evaluated as the time for pavement construction approaches.

We recommend the moisture content and density of the upper 9 inches of the subgrade be evaluated and the pavement subgrades be proofrolled within two days prior to commencement of actual paving operations. Areas not in compliance with the required ranges of moisture or density should be moisture conditioned and recompacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the material with compacted structural fill.

After proofrolling and repairing deep subgrade deficiencies, the entire subgrade should be scarified and developed as recommended in the **Earthwork** section to provide a more consistent subgrade for pavement construction. Areas that appear desiccated (dry) following site stripping may require further undercutting and moisture conditioning. If a significant precipitation event occurs after the evaluation or if the surface becomes disturbed, the subgrade should be reviewed by qualified personnel immediately prior to paving. The subgrade should be in its finished form at the time of the final review.

Pavement Design Considerations

We anticipate that the new parking areas (i.e., light-duty) will be primarily used by personal vehicles (cars and pick-up trucks). Delivery trucks and refuse disposal vehicles are expected in the drive lanes (i.e., medium-duty). We have estimated up to five trucks per week.

Pavement thickness can be calculated using AASHTO, Asphalt Institute, and/or other methods if specific wheel loads, axle configurations, frequencies, and desired pavement life are provided. Pavement design methods are intended to provide structural pavement sections with adequate

thickness over a particular subgrade such that wheel loads are reduced to a level the subgrade can support. Terracon can provide thickness recommendations for pavements subjected to loads other than personal vehicle and occasional delivery and trash removal truck traffic, if this information is provided.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Grades adjacent to pavements should slope down from the edges at a minimum 2 percent;
- The pavement subgrade and surface should have a minimum 2 percent slope to promote proper drainage;
- Pavement drainage should be installed in areas anticipated for frequent wetting;
- Joint sealant should be installed and cracks sealed immediately; and
- Compacted, low permeability backfill should be placed against the exterior sides of curbs and gutters, and landscaped areas in, or adjacent to pavements to reduce moisture migration into pavement subgrade soils.

Estimates of Minimum Pavement Thickness

Asphaltic concrete pavements can be used for pavements such as drive lanes and parking areas. We recommend Portland cement concrete (PCC) pavements for entrance aprons, trash container pads, loading docks, drive-through lanes, and in any other areas subjected to heavy wheel loads and/or channelized or turning traffic.

Recommended thicknesses for light- and medium-duty areas are provided in the table below.

Pavement Section Thickness (inches)						
Traffic Area	**Alternative**	**Asphalt Concrete**		**Portland Cement Concrete** [1]	**Aggregate Base Course** [2]	**Total Thickness**
		Surface Course	**Base Course**			
Light-Duty (car parking)	PCC	--	--	5	4	9
	ACC	3	--	--	8	11
Medium-Duty (drives and loading areas)	PCC	--	--	6	4	10
	ACC	2	3	--	8	13
Trash Container Pad [3]	PCC	--	--	7	4	11

1. 4,000 psi at 28 days, 4-inch maximum slump and 5 to 7 percent air entrained pavements are recommended for trash container pads and in any other areas subjected to heavy wheel loads and/or turning traffic.
2. Crushed stone (MoDOT Type 5 aggregate)
3. The trash container pad should be large enough to support the container and the tipping axle of the collection truck.

Although not required for structural support, a minimum 4-inch thick aggregate base course layer is recommended for the PCC pavements to help reduce the potential for slab curl, shrinkage cracking, and subgrade "pumping" through joints. Proper joint spacing will also be required for PCC pavements to resist excessive slab curling and shrinkage cracking. All joints should be sealed to resist entry of foreign material and dowelled where necessary for load transfer.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrades should be graded to provide positive drainage within the granular base section. We recommend the subgrades beneath the pavement sections be graded to slope toward the storm water catch basins. A drainage collection and removal system (e.g., finger drains) could be used to allow water in the granular base to enter the storm sewers, or otherwise be removed from the granular base.

Pavement Maintenance

The pavement sections provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the first priority when implementing a pavement maintenance program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required. Geosynthetic reinforcement could be considered to extend the length of time before maintenance is required.

GENERAL COMMENTS

Our services are conducted with the understanding of the project as described in the proposal, and incorporate collaboration with the design team as we complete our services. The design team should collaborate with Terracon to confirm these assumptions and to prepare the final design plans and specifications. Any information conveyed prior to the final report is for informational purposes only and should not be considered or used for decision-making purposes.

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations may occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in the final report, to provide observation and testing services during construction. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our scope of services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third party beneficiaries intended. Any third party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation costs. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation costs. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, cost estimating, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Planned Location
5	28.6 to 35	Building area
5	10	Pavement areas

Boring Layout and Elevations: Unless otherwise noted, Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±20 feet). Approximate elevations were interpreted from the provided topographic site plan. If more precise elevations and boring locations are desired, we recommend the borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings with an ATV-mounted rotary drill rig using continuous flight, solid-stem augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. Soil sampling was performed using split-barrel sampling procedures.

In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance (SPT N-value). This value is used to estimate the in-situ relative density of cohesionless soils and the consistency of cohesive soils. A CME automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency (93 percent for Drill Rig 840) is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope.

The sampling depths, penetration distances, and other sampling information were recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

Based on the material's texture and plasticity, we describe and classify soil samples in accordance with the Unified Soil Classification System. The project engineer reviewed the field

data and assigned various laboratory tests to better understand the engineering properties of the soil strata. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods are applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- Water content
- Atterberg limits

SITE LOCATION AND EXPLORATION PLANS

Contents:

Note: All attachments are one page unless noted above.

SITE LOCATION

Barry-Lawrence Regional Library ■ Monett, MO
January 29, 2021 ■ Terracon Project No. B5205071

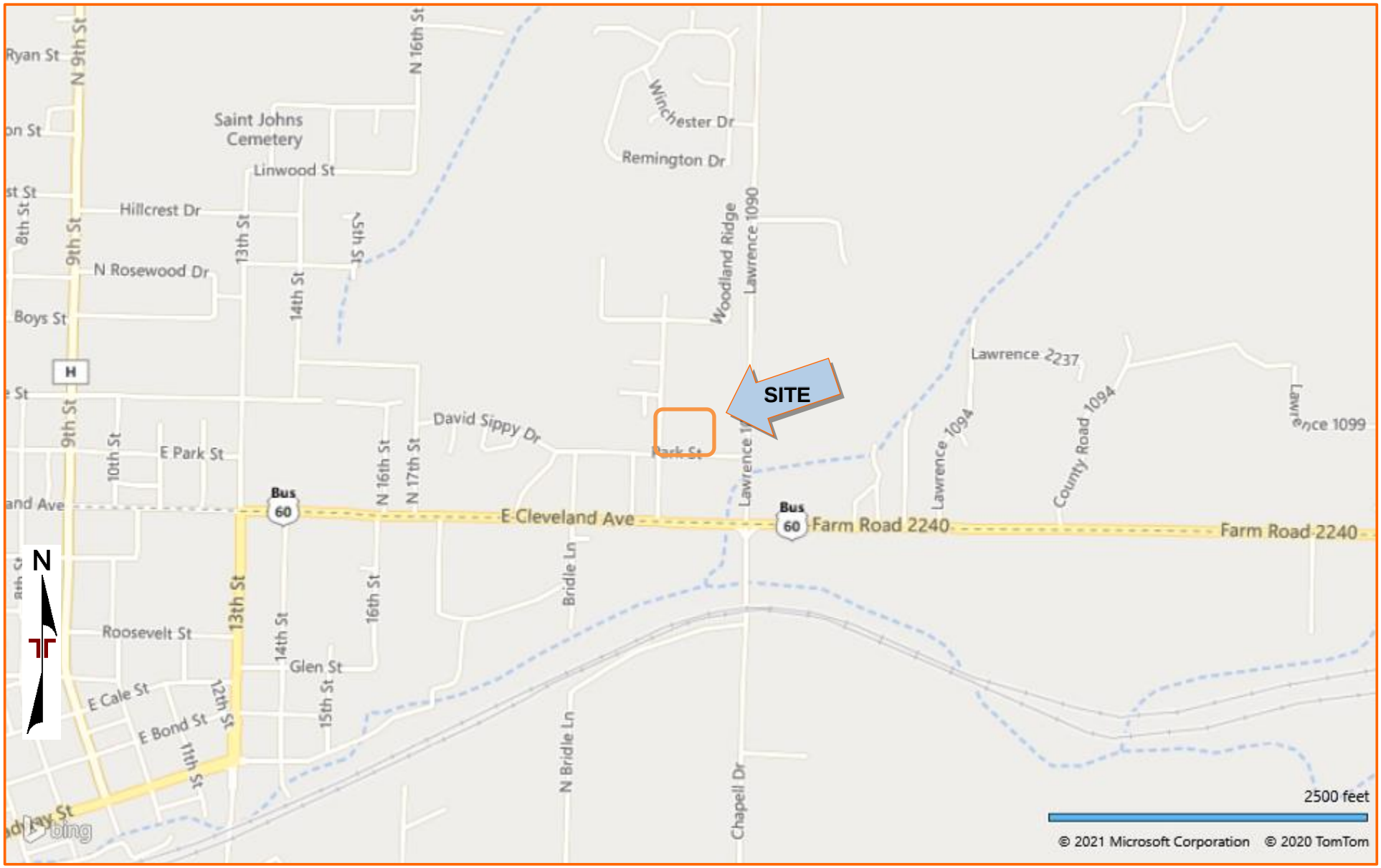


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

SOLUTION FEATURES MAP

Barry-Lawrence Regional Library ■ Monett, MO
January 29, 2021 ■ Terracon Project No. B5205071

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

BORING LOCATION DIAGRAM

Barry-Lawrence Regional Library ■ Monett, MO
January 29, 2021 ■ Terracon Project No. B5205071

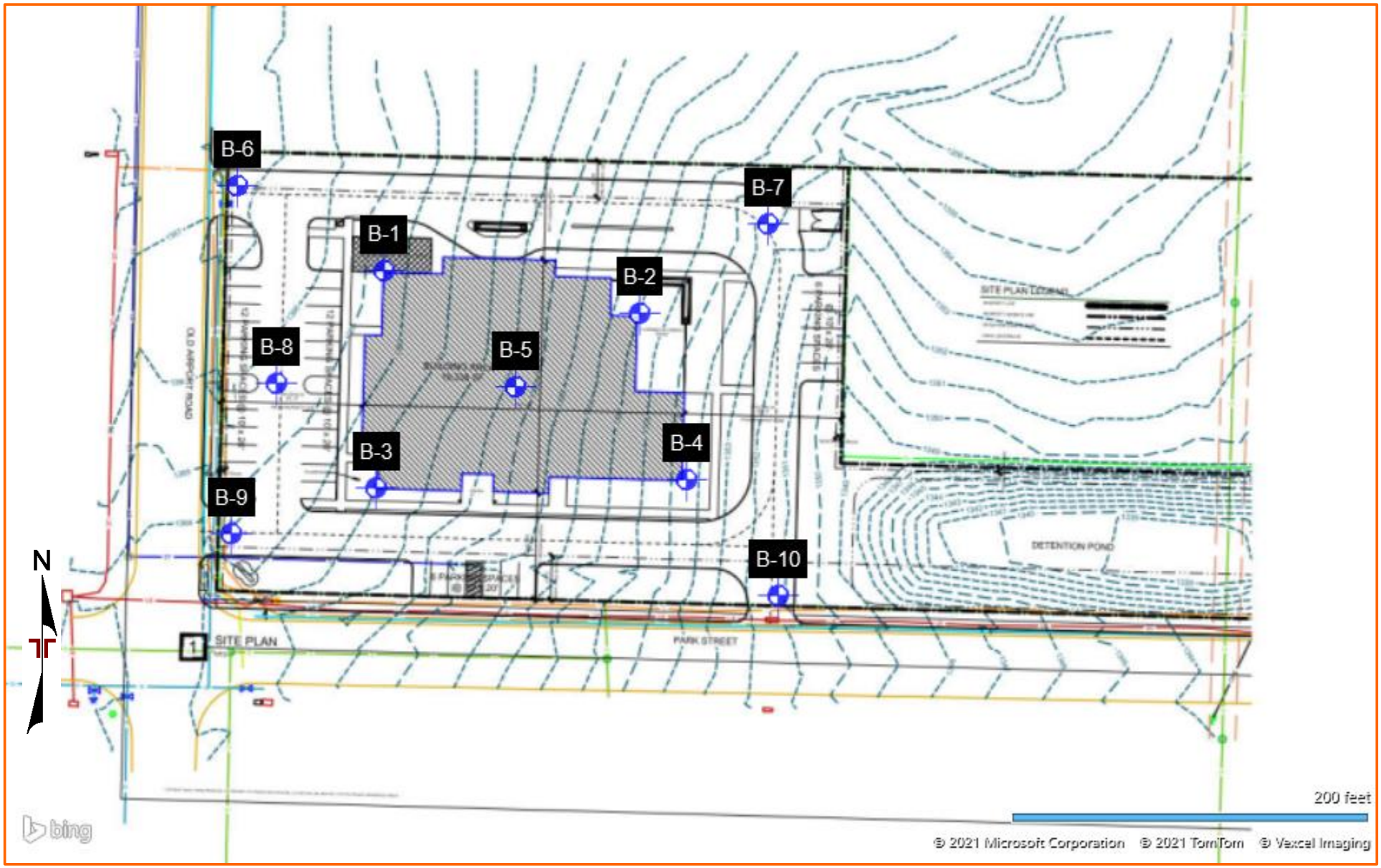


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
QUADRANGLES INCLUDE: MONETT, MO (1/1/1972) and VERONA, MO (1/1/1972).

EXPLORATION PLAN

Barry-Lawrence Regional Library ■ Monett, MO
January 29, 2021 ■ Terracon Project No. B5205071

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Boring Logs (B-1 through B-10)
GeoModel

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9304° Longitude: -93.9023°

Approximate Surface Elev.: 1364.5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		0.4	1364+/-									
			TOPSOIL, (approximately 5 inches)									
1			**CLAYEY GRAVEL (GC)**, red, very dense			X	7	18-50/5"	1		12.4	
1			medium dense			X	9	21-7-14 N=21	2		15.3	
		5.0	1359.5+/-	5								
			GRAVELLY FAT CLAY (CH), red, very stiff			X	11	11-9-8 N=17	3	2.5	36.1	
		8.0	1356.5+/-									
2			**FAT CLAY (CH)**, trace gravel, red, stiff to hard	10		X	12	10-10-9 N=19	4	3.0	36.7	
2				15		X	10	4-10-27 N=37	5	3.0	40.4	85-36-49
2				20		X	16	10-6-6 N=12	6	1.75	50.9	
		22.0	1342.5+/-									
1			**CLAYEY GRAVEL (GC)**, red, medium dense	25		X	14	11-11-9 N=20	7		37.8	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-1

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9304° Longitude: -93.9023°

Approximate Surface Elev.: 1364.5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1			**CLAYEY GRAVEL (GC)**, red, medium dense *(continued)*									
		27.0	1337.5+/-									
2			**FAT CLAY (CH)**, trace gravel, red, stiff			X	15	5-5-5 N=10	8	1.75	63.4	
		32.0	1332.5+/-	30								
1			**CLAYEY GRAVEL (GC)**, red and brown, very dense			X	10	4-14-50/5"	9		63.3	
		34.9	1329.5+/-									
			Sampler Refusal at 34.9 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-2

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9303° Longitude: -93.9018°

Approximate Surface Elev.: 1357 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		0.3	1356.5+/-									
			TOPSOIL, (approximately 3 inches)									
1			**CLAYEY GRAVEL (GC)**, red and brown, very dense			X	6	30-50/4"	1		13.9	
		3.0	1354+/-									
			FAT CLAY (CH), trace gravel, red, stiff to very stiff	5		X	10	10-7-10 N=17	2	2.75	18.0	
2						X	8	10-5-7 N=12	3	2.5	25.8	
		8.0	1349+/-									
			GRAVELLY FAT CLAY (CH), red, very stiff	10		X	16	14-18-11 N=29	4	1.75	34.7	
		12.0	1345+/-									
			CLAYEY GRAVEL (GC), red, medium dense	15		X	18	5-5-6 N=11	5		42.3	
1				20		X	11	5-4-7 N=11	6		34.2	
		22.0	1335+/-									
			GRAVELLY FAT CLAY (CH), red, stiff	25		X	16	9-4-6 N=10	7	1.5	54.0	
2												

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021	Boring Completed: 01-11-2021
Drill Rig: CME 750X	Driller: DH
Project No.: B5205071	

BORING LOG NO. B-2

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9303° Longitude: -93.9018°

Approximate Surface Elev.: 1357 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
2			**GRAVELLY FAT CLAY (CH)**, red, stiff *(continued)*									
		28.6	1328.5+/-				0	50/1"	8			
			Auger Refusal at 28.6 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021	Boring Completed: 01-11-2021
Drill Rig: CME 750X	Driller: DH
Project No.: B5205071	

BORING LOG NO. B-3

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9300° Longitude: -93.9023°

Approximate Surface Elev.: 1362 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		0.5	1361.5+/-									
			TOPSOIL, (approximately 6 inches)									
2			**FAT CLAY (CH)**, trace gravel, red, stiff			X	14	3-5-9 N=14	1	1.5	24.7	
		3.0	1359+/-									
1			**CLAYEY GRAVEL (GC)**, red, dense to very dense	5		X	12	24-30-22 N=52	2		21.0	
						X	9	24-12-25 N=37	3		21.3	
		8.0	1354+/-									
2			**GRAVELLY FAT CLAY (CH)**, red, hard	10		X	16	22-18-20 N=38	4	2.5	32.0	
		12.0	1350+/-									
1			**CLAYEY GRAVEL (GC)**, red, medium dense to dense	15		X	15	10-12-23 N=35	5		27.0	
				20		X	15	12-13-15 N=28	6		35.1	
		22.0	1340+/-									
2			**GRAVELLY FAT CLAY (CH)**, red, stiff to very stiff	25		X	9	9-8-12 N=20	7	0.5	32.1	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-3

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9300° Longitude: -93.9023°

Approximate Surface Elev.: 1362 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
2			**GRAVELLY FAT CLAY (CH)**, red, stiff to very stiff *(continued)*									
				30		X	18	4-4-5 N=9	8	2.0	47.9	
						X	17	11-7-6 N=13	9		65.7	
		35.0	1327+/-	35								
			Boring Terminated at 35 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-4

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9300° Longitude: -93.9017°

Approximate Surface Elev.: 1355 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.3	1354.5+/-									
		TOPSOIL, (approximately 4 inches)										
		CLAYEY GRAVEL (GC), red and brown, medium dense to dense				X	10	20-20-25 N=45	1		14.6	
						X	5	10-14-10 N=24	2		14.8	
				5								
2		5.0	1350+/-			X	13	8-8-7 N=15	3	2.0	40.3	84-37-47
		FAT CLAY (CH), trace gravel, red, stiff to very stiff				X	15	10-10-9 N=19	4	3.5	41.6	
				10								
						X	18	9-5-6 N=11	5	1.5	47.0	
				15								
1		17.0	1338+/-									
		CLAYEY GRAVEL (GC), red, medium dense				X	14	7-7-8 N=15	6		37.2	
				20								
						X	18	7-10-7 N=17	7		45.7	
				25								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-4

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9300° Longitude: -93.9017°

Approximate Surface Elev.: 1355 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1			**CLAYEY GRAVEL (GC)**, red, medium dense *(continued)*									
		27.0	1328+/-									
2			**GRAVELLY FAT CLAY (CH)**, red, medium stiff to stiff	30			5	4-4-4 N=8	8	2.5	43.9	
							15	4-4-4 N=8	9	0.5	70.4	
		35.0	1320+/-	35								
			Boring Terminated at 35 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-5

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9302° Longitude: -93.9020°

Approximate Surface Elev.: 1351 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	DESCRIPTION
	0.5	1350.5+/-	**TOPSOIL**, (approximately 6 inches)
1			**CLAYEY GRAVEL (GC)**, red and brown, dense
	3.0	1348+/-	
			GRAVELLY FAT CLAY (CH), red, stiff
	5.0	1346+/-	
			FAT CLAY (CH), trace gravel, red, very stiff
	12.0	1339+/-	
2			**GRAVELLY FAT CLAY (CH)**, red, very stiff
			stiff

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		X	8	5-17-16 N=33	1		20.0	
		X	16	4-5-6 N=11	2	1.0	43.2	
5		X	14	14-14-12 N=26	3	2.0	30.9	
		X	11	12-16-12 N=28	4	2.5	37.9	
10								
		X	6	8-10-7 N=17	5	2.0	46.5	
15								
		X	3	11-7-10 N=17	6	3.0	41.7	
20								
		X	10	10-5-7 N=12	7	0.5	47.8	
25								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021	Boring Completed: 01-11-2021
Drill Rig: CME 750X	Driller: DH
Project No.: B5205071	

BORING LOG NO. B-5

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9302° Longitude: -93.9020°

Approximate Surface Elev.: 1351 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
2			**GRAVELLY FAT CLAY (CH)**, red, very stiff *(continued)*									
		27.0	1324+/-									
1			**CLAYEY GRAVEL (GC)**, red, medium dense to very dense	30			12	14-7-5 N=12	8		44.4	
		34.2	1317+/-				2	15-50/2"	9		35.3	
			Sampler Refusal at 34.2 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-6

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9305° Longitude: -93.9025°

Approximate Surface Elev.: 1367 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		0.3	1366.5+/-									
		TOPSOIL, (approximately 3 inches)										
1		**CLAYEY GRAVEL (GC)**, red and brown, medium dense to dense				X	10	5-9-13 N=22	1		18.0	
						X	11	13-17-17 N=34	2		34.2	
		5.0	1362+/-	5								
2		**GRAVELLY FAT CLAY (CH)**, red, very stiff to hard										
						X	9	7-11-13 N=24	3	2.0	32.3	
						X	12	14-16-19 N=35	4	1.0	28.8	
		10.0	1357+/-	10								
		Boring Terminated at 10 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-7

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9304° Longitude: -93.9015°

Approximate Surface Elev.: 1354 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		0.3	1353.5+/-									
			TOPSOIL, (approximately 3 inches)									
3			**GRAVELLY LEAN CLAY (CL)**, red, medium stiff			X	8	2-2-4 N=6	1		12.6	30-18-12
		3.0	1351+/-									
			FAT CLAY (CH), trace gravel, red, stiff			X	7	4-5-9 N=14	2	1.0	25.2	
		5.0	1349+/-	5								
2			**GRAVELLY FAT CLAY (CH)**, red, very stiff to hard			X	10	14-16-14 N=30	3	1.0	16.2	
		8.0	1346+/-									
1			**CLAYEY GRAVEL (GC)**, red, medium dense			X	5	10-14-12 N=26	4		21.4	
		10.0	1344+/-	10								
			Boring Terminated at 10 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021	Boring Completed: 01-11-2021
Drill Rig: CME 750X	Driller: DH
Project No.: B5205071	

BORING LOG NO. B-8

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9302° Longitude: -93.9025°

Approximate Surface Elev.: 1365.5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		0.4	1365+/-									
1			**TOPSOIL**, (approximately 5 inches)									
			CLAYEY GRAVEL (GC), red and brown, medium dense to dense			X	10	30-20-12 N=32	1		16.1	
						X	8	17-14-12 N=26	2		23.9	
				5								
						X	6	13-17-16 N=33	3		19.1	
						X	4	15-11-11 N=22	4		16.1	
		10.0	1355.5+/-	10								
			Boring Terminated at 10 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-9

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9300° Longitude: -93.9026°

Approximate Surface Elev.: 1365 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
1		0.3	1364.5+/-									
		TOPSOIL, (approximately 4 inches)										
		CLAYEY GRAVEL (GC), red and brown, dense to very dense				X	11	9-17-15/0"	1		16.4	
						X	9	30-34-14 N=48	2		11.7	
		5.0	1360+/-	5								
2		**GRAVELLY FAT CLAY (CH)**, red, very stiff										
						X	10	10-13-15 N=28	3	1.5	29.1	
						X	5	36-15-12 N=27	4	2.0	22.5	
		10.0	1355+/-	10								
		Boring Terminated at 10 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

BORING LOG NO. B-10

PROJECT: Barry-Lawrence Regional Library

CLIENT: Paragon Architecture, LLC
Springfield, Missouri

SITE: 1000 Old Airport Rd.
Monett, Missouri

LOCATION See Exploration Plan

Latitude: 36.9299° Longitude: -93.9015°

Approximate Surface Elev.: 1351.5 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	SAMPLE NUMBER	POCKET PENETROMETER (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		0.3	1351+/-									
		TOPSOIL, (approximately 4 inches)										
1		**CLAYEY GRAVEL (GC)**, red and brown, very dense				X	13	25-35-30 N=65	1		22.7	
		medium dense below 3 feet		5		X	10	9-13-15 N=28	2		12.1	
						X	8	8-12-13 N=25	3		25.1	
				10		X	5	14-10-10 N=20	4		29.6	
		10.0	1341.5+/-									
		Boring Terminated at 10 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.25" O.D. center flight augers

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from a topographic site plan.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
4765 W Junction St
Springfield, MO

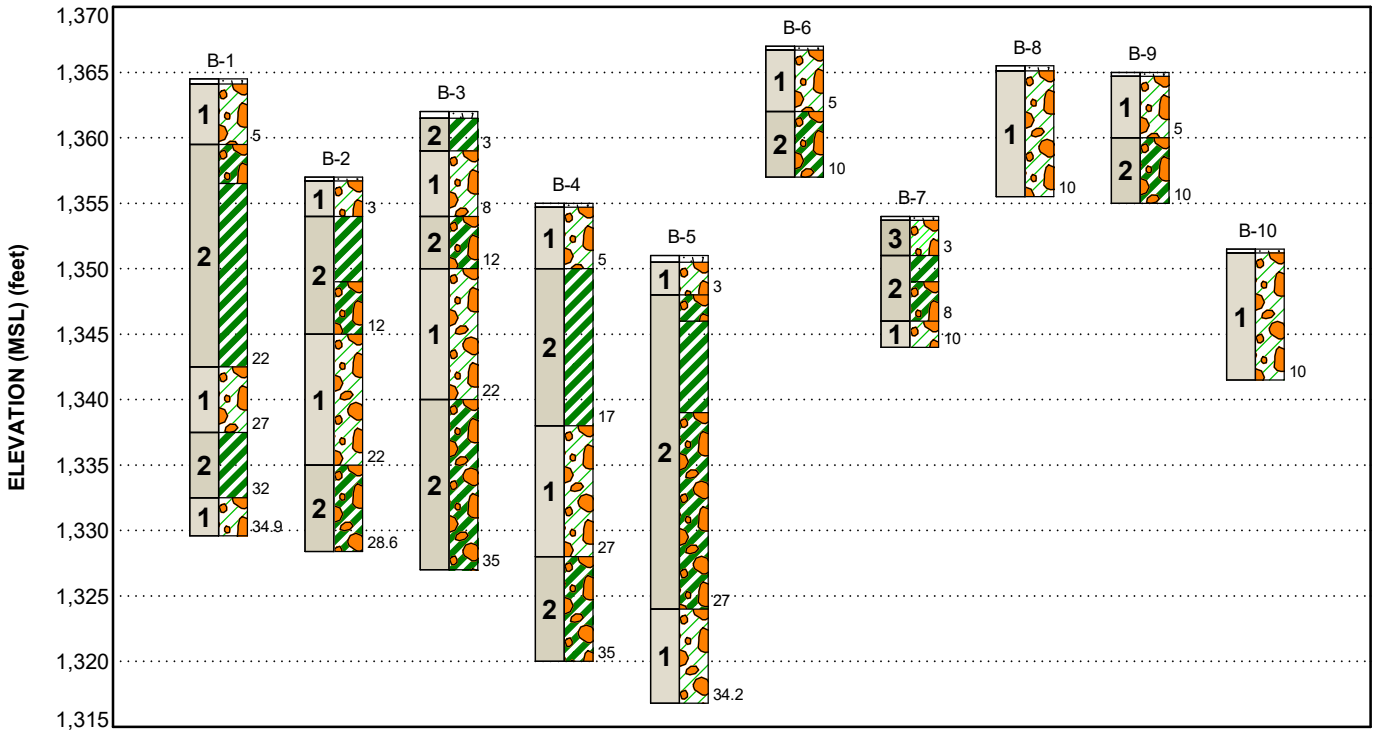
Boring Started: 01-11-2021 | Boring Completed: 01-11-2021

Drill Rig: CME 750X | Driller: DH

Project No.: B5205071

GEOMODEL

Barry-Lawrence Regional Library ■ Monett, Missouri
Terracon Project No. B5205071



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Gravel**	Clayey gravel (GC)
2	**Fat Clay**	Gravelly fat clay (CH) and fat clay (CH) with trace amounts of gravel
3	**Lean Clay**	Gravelly lean clay (CL)

LEGEND

- Topsoil
- Clayey Gravel
- Gravelly Fat Clay
- Fat Clay
- Gravelly Lean Clay

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
Barry-Lawrence Regional Library ■ Monett, Missouri
Terracon Project No. B5205071

Terracon GeoReport

SAMPLING	WATER LEVEL	FIELD TESTS
Split Spoon	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** **Cave In Encountered** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:**	Cu ³ 4 and 1 £ Cc £ 3 [E]		GW	Well-graded gravel [F]
			Cu < 4 and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines:	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:**	Cu ³ 6 and 1 £ Cc £ 3 [E]		SW	Well-graded sand [I]
			Cu < 6 and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines:	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ³ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ³ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ³ 30% plus No. 200 predominantly sand, add "sandy" to group name.

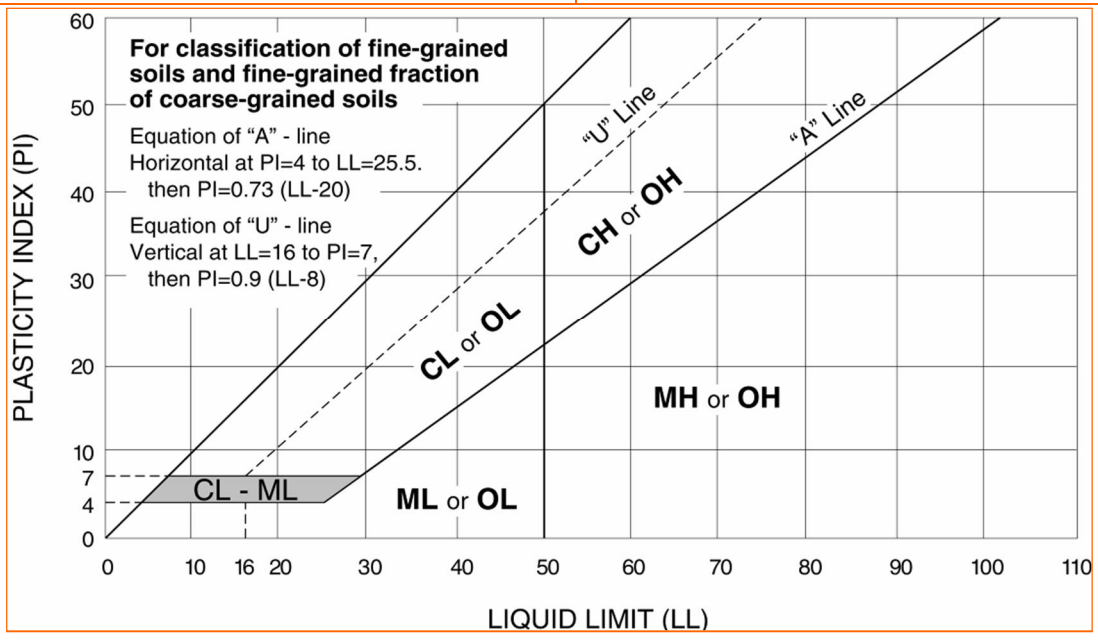
[M] If soil contains ³ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ³ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Stormwater Pollution Prevention Plan (SWPPP)

For Construction Activities At:

Barry-Lawrence Regional Library
2200 Park Street
Monett, Missouri, 65708

SWPPP Prepared For:

Barry Lawrence Regional Library
Gina Milburn, BLRL Director
213 6th Street #2147
Monett, Missouri, 65708
(417) 235-6646

SWPPP Prepared By:

Toth & Associates, Inc.
David Garrett, P.E.
1550 E. Republic Rd
Springfield, Missouri, 65804
417-888-0645
dgarrett@tothassociates.com

SWPPP Preparation Date:

05/26/2021

Estimated Project Dates:

Project Start Date: 07/01/2021

Project Completion Date: 09/30/2022

Contents

SECTION 1: CONTACT INFORMATION/RESPONSIBLE PARTIES

1.1 Operator(s) / Subcontractor(s)

Instructions (see definition of "operator" at CGP Part 1.1.1):

- Identify the operator(s) who will be engaged in construction activities at the site. Indicate respective responsibilities, where appropriate. Also include the 24-hour emergency contact.
- List subcontractors expected to work on-site. Notify subcontractors of stormwater requirements applicable to their work.
- Consider using Subcontractor Agreements such as the type included as a sample in Appendix G of the Template.

Operator(s):

Unknown, will be determined by the Contractor.

Subcontractor(s):

Unknown, will be determined by the Contractor.

Emergency 24-Hour Contact:

Unknown, will be determined by the Contractor.

1.2 Stormwater Team

Instructions (see CGP Part 7.2.2):

- Identify the individuals (by name or position) that are part of the project's stormwater team, their individual responsibilities, and which members are responsible for inspections. At a minimum the stormwater team is comprised of individuals who are responsible for overseeing the development of the SWPPP, any later modifications to it, and for compliance with the permit requirements (i.e., installing and maintaining stormwater controls, conducting site inspections, and taking corrective actions where required).
- Each member of the stormwater team must have ready access to either an electronic or paper copy of applicable portions of the 2017 CGP and the SWPPP.

Stormwater Team		
Name and/or position, and contact	Responsibilities	I Have Read the CGP and Understand the Applicable Requirements
Unknown, will be determined by the Contractor		☐ Yes Date:
Unknown, will be determined by the Contractor		☐ Yes Date:
Unknown, will be determined by the Contractor		☐ Yes Date:

[Insert or delete rows as necessary.]

SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project/Site Information

Instructions (see "Project/Site Information" section of Appendix J – NOI form):

- In this section, you are asked to compile basic site information that will be helpful when you file your NOI.

Project Name and Address

Project/Site Name: Barry-Lawrence Regional Library
Project Street/Location: Old Airport Road and Park Street
City: Monett
State: Missouri
ZIP Code: 65708
County or Similar Subdivision: Lawrence

Business days and hours for the project: 302 Business Days

Project Latitude/Longitude

Latitude: 36.930167° N (decimal degrees)

Longitude: - 93.901964 ° W (decimal degrees)

Latitude/longitude data source:

☐ Map ☐ GPS ☒ Other (please specify): Google Earth

Horizontal Reference Datum:

☐ NAD 27 ☒ NAD 83 ☐ WGS 84

Additional Project Information

Are you requesting permit coverage as a "federal operator" as defined in Appendix A of the 2017 CGP? ☐ Yes ☒ No

Is the project/site located on Indian country lands, or located on a property of religious or cultural significance to an Indian tribe? ☐ Yes ☒ No

If yes, provide the name of the Indian tribe associated with the area of Indian country (including the name of Indian reservation if applicable), or if not in Indian country, provide the name of the Indian tribe associated with the property: N/A

If you are conducting earth-disturbing activities in response to a public emergency, document the cause of the public emergency *(e.g., natural disaster, extreme flooding conditions)*, information substantiating its occurrence *(e.g., state disaster declaration)*, and a description of the construction necessary to reestablish effective public services: N/A

2.2 Discharge Information

Instructions (see "Discharge Information" section of Appendix J – NOI form):

- In this section, include information relating to your site's discharge. This information corresponds to the "Discharge Information" section of the NOI form.
- List all of the stormwater points of discharge from your site. Identify each point of discharge with a unique 3-digit ID (e.g., 001, 002).
- For each unique point of discharge you list, specify the name of the first water of the U.S. that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to. You may have multiple points of discharge that discharge to the same receiving water.
- Next, specify whether any waters of the U.S. that you discharge to are listed as "impaired" as defined in Appendix A, and the pollutants causing the impairment. Identify any Total Maximum Daily Loads (TMDL) that have been completed for any of the waters of the U.S. that you discharge to and the pollutants for which there is a TMDL. For more information on impaired waters and TMDLs, including a list of TMDL contacts and links by state, visit https://www.epa.gov/tmdl.
- Finally, indicate whether any water of the U.S. that you discharge to is designated as a Tier 2, Tier 2.5, or Tier 3 water and if so, what the designation is (2, 2.5, or 3). A list of Tier 2, 2.5, and 3 waters is provided in Appendix F.

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? ☐ Yes ☒ No

Are there any waters of the U.S. within 50 feet of your project's earth disturbances? ☐ Yes ☒ No

For each point of discharge, provide a point of discharge ID (a unique 3-digit ID, e.g., 001, 002), the name of the first water of the U.S. that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to, and the following receiving water information, if applicable:								
Point of Discharge ID	Name of receiving water:	Is the receiving water impaired (on the CWA 303(d) list)?	If yes, list the pollutants that are causing the impairment:	Has a TMDL been completed for this receiving waterbody?	If yes, list TMDL Name and ID:	Pollutant(s) for which there is a TMDL:	Is this receiving water designated as a Tier 2, Tier 2.5, or Tier 3 water?	If yes, specify which Tier (2, 2.5, or 3)?
[001]	Unnamed Tributary of Kelly Creek (460)	☐ Yes ☒ No		☐ Yes ☒ No			☐ Yes ☒ No	N/A
N/A		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	N/A
N/A		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	N/A
N/A		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	N/A
N/A		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	N/A
N/A		☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	N/A

[Include additional rows or delete as necessary.]

2.3 Nature of the Construction Activities

Instructions (see CGP Parts 1.2.1.c and 7.2.3):

- Provide a general description of the nature of the construction activities at your site.
- Describe the size of the property (in acres or in miles if a linear construction site), the total area expected to be disturbed by the construction activities (to the nearest quarter acre or quarter mile if a linear construction site), and the maximum area expected to be disturbed at any one time.
- Indicate the type of construction site, whether there will be certain demolition activities, and whether the predevelopment land use was for agriculture.
- Provide a list and description of all pollutant-generating activities (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations) and indicate for each activity the type of pollutant that will be generated (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels) and could be discharged in stormwater from your site.
- Describe the construction support activities covered by this permit (see Part 1.2.1.c of the permit).

General Description of Project

Provide a general description of the nature of your construction activities, including the age dates of past renovations for structures that are undergoing demolition:

Construction of a new regional library center for Barry and Lawrence County located in the northeast corner of the intersection of Old Airport Road and Park Street. Construction activities to include the erection of a new 20,400 SF building, paving of associated parking lot, and the installation and connection of required utility services.

Size of Construction Site

Size of Property	2.57 acres
Total Area Expected to be Disturbed by Construction Activities	2.16 acres
Maximum Area Expected to be Disturbed at Any One Time	2.16 acres

[Repeat as necessary for individual project phases.]

Type of Construction Site *(check all that apply)*:

☐ Single-Family Residential ☐ Multi-Family Residential ☐ Commercial ☐ Industrial
☒ Institutional ☐ Highway or Road ☐ Utility ☐ Other

Will there be demolition of any structure built or renovated before January 1, 1980? ☐ Yes ☒ No

If yes, do any of the structures being demolished have at least 10,000 square feet of floor space? ☐ Yes ☐ No ☒ N/A

Was the pre-development land use used for agriculture (see Appendix A for definition of "agricultural land")? ☐ Yes ☒ No

Pollutant-Generating Activities

List and describe all pollutant-generating activities and indicate for each activity the type of pollutant that will be generated. Take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed during construction.

Pollutant-Generating Activity (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations)	**Pollutants or Pollutant Constituents** (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels)
Paving Operations	Sediment, Paints, Oils, Grease
Concrete Washout	Heavy Metals, Trash, Sediment
Structure Construction	Heavy Metals, Paints, Trash
Equipment Washing	Sediment, Oils, Grease, Trash

[Include additional rows or delete as necessary.]

Construction Support Activities *(only provide if applicable)*

Describe any construction support activities for the project (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas):

Soil is to be stockpiled on the site as determined necessary by the contractor.

Contact information for construction support activity:

Unknown, will be determined by the contractor.

[Repeat as necessary.]

2.4 Sequence and Estimated Dates of Construction Activities

Instructions (see CGP Part 7.2.5):

- Describe the intended construction sequence and duration of major activities.
- For each portion or phase of the construction site, include the following:
  - ✓ Commencement and duration of construction activities, including clearing and grubbing, mass grading, demolition activities, site preparation (i.e., excavating, cutting and filling), final grading, and creation of soil and vegetation stockpiles requiring stabilization;
  - ✓ Temporary or permanent cessation of construction activities;
  - ✓ Temporary or final stabilization of areas of exposed soil. The dates for stabilization must reflect the applicable deadlines to which you are subject to in Part 2.2.14; and
  - ✓ Removal of temporary stormwater controls and construction equipment or vehicles, and cessation of any pollutant-generating activities.
- The construction sequence must reflect the following requirements:
  - ✓ Part 2.1.3 (installation of stormwater controls); and
  - ✓ Parts 2.2.14 (stabilization deadlines).

Phase I

Pre-Construction	
Estimated Start Date of Construction Activities for this Phase	7/19/2021
Estimated End Date of Construction Activities for this Phase	9/30/2022
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	N/A
Estimated Date(s) when Stormwater Controls will be Removed	9/30/2022

Phase II

Construction & Grading	
Estimated Start Date of Construction Activities for this Phase	8/1/2021
Estimated End Date of Construction Activities for this Phase	7/29/2022
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	N/A
Estimated Date(s) when Stormwater Controls will be Removed	9/30/2022

Phase III

Stabilization	
Estimated Start Date of Construction Activities for this Phase	8/1/2022
Estimated End Date of Construction Activities for this Phase	9/30/2022
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	N/A
Estimated Date(s) when Stormwater Controls will be Removed	9/30/2022

2.5 Authorized Non-Stormwater Discharges

Instructions (see CGP Parts 1.2.2 and 7.2.5):

- Identify all authorized sources of non-stormwater discharges. The authorized non-stormwater discharges identified in Part 1.2.2 of the 2017 CGP include:
  - ✓ Discharges from emergency fire-fighting activities;
  - ✓ Fire hydrant flushings;
  - ✓ Landscape irrigation;
  - ✓ Waters used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;
  - ✓ Water used to control dust;
  - ✓ Potable water including uncontaminated water line flushings;
  - ✓ External building washdown, provided soaps, solvents and detergents are not used, and external surfaces do not contain hazardous substances (e.g., paint or caulk containing PCBs);
  - ✓ Pavement wash waters provided spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and detergents are not used. You are prohibited from directing pavement wash waters directly into any water of the U.S., storm drain inlet, or stormwater conveyance, unless the conveyance is connected to a sediment basin, sediment trap, or similarly effective control;
  - ✓ Uncontaminated air conditioning or compressor condensate;
  - ✓ Uncontaminated, non-turbid discharges of ground water or spring water;
  - ✓ Foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water; and
  - ✓ Construction dewatering water discharged in accordance with Part 2.4.

List of Authorized Non-Stormwater Discharges Present at the Site

Type of Authorized Non-Stormwater Discharge	Likely to be Present at Your Site?
Discharges from emergency fire-fighting activities	☐ Yes ☒ No
Fire hydrant flushings	☒ Yes ☐ No
Landscape irrigation	☐ Yes ☒ No
Waters used to wash vehicles and equipment	☒ Yes ☐ No
Water used to control dust	☒ Yes ☐ No
Potable water including uncontaminated water line flushings	☒ Yes ☐ No
External building washdown (soaps/solvents are not used and external surfaces do not contain hazardous substances)	☐ Yes ☒ No
Pavement wash waters	☒ Yes ☐ No
Uncontaminated air conditioning or compressor condensate	☐ Yes ☒ No

Uncontaminated, non-turbid discharges of ground water or spring water	☐ Yes ☒ No
Foundation or footing drains	☒ Yes ☐ No
Construction dewatering water	☐ Yes ☒ No

(Note: You are required to identify the likely locations of these authorized non-stormwater discharges on your site map. See Section 2.6, below, of the SWPPP Template.)

2.6 Site Maps

Instructions (see CGP Part 7.2.4):

- Attach site maps in Appendix A of the Template. For most projects, a series of site maps is necessary and recommended. The first should show the undeveloped site and its current features. An additional map or maps should be created to show the developed site or, for more complicated sites, show the major phases of development.

These maps must include the following features:

- Boundaries of the property and of the locations where construction will occur, including:
  - ✓ Locations where earth-disturbing activities will occur, noting any phasing of construction activities and any demolition activities;
  - ✓ Approximate slopes before and after major grading activities. Note areas of steep slopes, as defined in CGP Appendix A;
  - ✓ Locations where sediment, soil, or other construction materials will be stockpiled;
  - ✓ Locations of any crossings of waters of the U.S.;
  - ✓ Designated points where vehicles will exit onto paved roads;
  - ✓ Locations of structures and other impervious surfaces upon completion of construction; and
  - ✓ Locations of on-site and off-site construction support activity areas covered by this permit (see Part 1.2.1.c).
- Locations of all waters of the U.S., including wetlands, on your site and within one mile downstream of the site's discharge point. Indicate which waterbodies are listed as impaired, and which are identified by your state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 waters.
- Areas of federally-listed critical habitat for endangered or threatened species within the site and/or at discharge locations.
- Type and extent of pre-construction cover on the site (e.g., vegetative cover, forest, pasture, pavement, structures)
- Drainage pattern(s) of stormwater and authorized non-stormwater before and after major grading activities.
- Stormwater and authorized non-stormwater discharge locations, including:
  - ✓ Locations where stormwater and/or authorized non-stormwater will be discharged to storm drain inlets; and
  - ✓ Locations where stormwater or allowable non-stormwater will be discharged to waters of the U.S. (including wetlands).
- Locations of all potential pollutant-generating activities.
- Locations of stormwater controls, including natural buffer areas and any shared controls utilized to comply with the permit.
- Locations where polymers, flocculants, or other treatment chemicals will be used and stored.

SECTION 3: DOCUMENTATION OF COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

3.1 Endangered Species Protection

Instructions (see CGP Parts 1.1.5, 7.2.9.a, Appendix D, and the "Endangered Species Protection" section of the Appendix J – NOI form):

Using the instructions in Appendix D of the permit, determine under which criterion listed below (A-F) you are eligible for coverage under this permit with respect to the protection of endangered species. To make this determination, you must use information from **BOTH** the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). Both the NMFS and USFWS maintain lists of Endangered Species Act-listed (ESA-listed) species and designated critical habitat. Operators must consult both when determining their eligibility.

- Check only 1 box, include the required information and provide a sound basis for supporting the criterion selected. Select the most conservative criterion that applies
- Include documentation supporting your determination of eligibility.
- A step-by-step guide and flow-chart on ESA provisions for EPA's CGP is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#species

Eligibility Criterion

Under which criterion listed in Appendix D are you eligible for coverage under this permit?

☐ **Criterion A**: No ESA-listed species and/or designated critical habitat present in action area. Using the process outlined in Appendix D of this permit, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's "action area" as defined in Appendix A of this permit.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion A should identify the USFWS and NMFS information sources used. Attaching aerial image(s) of the site to your NOI is helpful to EPA, USFWS, and NMFS in confirming eligibility under this criterion. Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers. Check the applicable source(s) of information you relied upon:

☐ Specific communication with staff of the USFWS and/or NMFS. N/A

☐ Species list from USFWS and/or NMFS. See the CGP ESA webpage, Step 2 for available websites. N/A

☐ **Criterion B:** Eligibility requirements met by another operator under the 2017 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2017 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2017CGP operator's notification of authorization under this permit. If your certification is based on another 2017 CGP operator's certification under criterion C, you must provide EPA with the

relevant supporting information required of existing dischargers in criterion C in your NOI form.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion B should identify the eligibility criterion of the other CGP NOI, the authorization date, and confirmation that the authorization is effective.

- ✓ Provide the 9-digit NPDES ID number from the other operator's NOI under the 2017 CGP: N/A
- ✓ Authorization date of the other 2017 CGP operator: N/A
- ✓ Eligibility criterion of the other 2017 CGP operator: ☐A ☐C ☐D ☐E ☐F
- ✓ Provide a brief summary of the basis the other operator used for selecting criterion A, C, D, E, or F: N/A

☒ **Criterion C:** Discharges not likely to adversely affect ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify to EPA that your site's discharges and discharge-related activities are not likely to adversely affect ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. You must also include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with this NOI.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion C should identify the information resources and expertise (e.g., state or federal biologists) used to arrive at this conclusion. Any supporting documentation should explicitly state that both ESA-listed species and designated critical habitat under the jurisdiction of the USFWS and/or NMFS were considered in the evaluation.

- ✓ Resources used to make determination: United States Department of the Interior Fish and Wildlife Service and Missouri Ecological Services Field Office
- ✓ ESA-listed Species/Critical Habitat in action area: Gray Bat (Endangered), Indiana Bat (Endangered), Northern Long-eared Bat (Threatened), Ozark Cavefish (Threatened), Neosho Mucket (Endangered). No Critical Habitats were located within the action area of this project.
- ✓ Distance between site and ESA-listed Species/Critical Habitat: Distance between project site and nearest woods where ESA-listed bat species may be found is 0.18 miles.
- ✓ How adverse effects will be avoided: The pre-construction status of the project site is a green area containing zero trees and no caves or mines where ESA-listed bat species may be found. Storm runoff from the developed project site will be conveyed to a detention basin which will discharge into an unnamed tributary of Kelly Creek. If the existing site does not adversely affect the listed species currently, the disturbance that the project will make likely will not make an impact.

☐ **Criterion D**: Coordination with USFWS and/or NMFS has successfully concluded.

Coordination between you and the USFWS and/or NMFS has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written concurrence from USFWS and/or NMFS that your site's discharges and discharge-related activities are not likely to adversely affect listed species and/or critical habitat. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion D should identify whether USFWS or NMFS or both agencies participated in coordination, the field office/regional office(s) providing that coordination, and the date that coordination concluded.

- ✓ Agency coordinated with: ☐USFWS ☐ NMFS
- ✓ Field/regional office(s) providing coordination: N/A
- ✓ Date coordination concluded: N/A
- ✓ Attach copies of any letters or other communication between you and the U.S. Fish & Wildlife Service or National Marine Fisheries Service concluding coordination activities.

☐ **Criterion E:** ESA Section 7 consultation has successfully concluded. Consultation between a Federal Agency and the USFWS and/or NMFS under section 7 of the ESA has concluded. The consultation must have addressed the effects of the construction site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS. To certify eligibility under this criterion, Indicate the result of the consultation:

- ☐ Biological opinion from USFWS and/or NMFS that concludes that the action in question (taking into account the effects of your site's discharges and discharge-related activities) is not likely to jeopardize the continued existence of listed species, nor the destruction or adverse modification of critical habitat; or
- ☐ Written concurrence from USFWS and/or NMFS with a finding that the site's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. You must include copies of the correspondence between yourself and the USFWS and/or NMFS in your SWPPP and this NOI.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion E should identify the federal action agency(ies) involved, the field office/regional office(s) providing that consultation, any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the consultation was completed.

- ✓ Federal agency(ies) involved: N/A
- ✓ Field/regional office(s) providing consultation: N/A
- ✓ Tracking numbers associated with consultation: N/A
- ✓ Date consultation completed: N/A
- ✓ Attach copies of any letters or other communication between you and the U.S. Fish & Wildlife Service or National Marine Fisheries Service concluding consultation.

☐ **Criterion F:** Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI.

Basis statement content/Supporting documentation: A basis statement supporting the selection of Criterion F should identify whether USFWS or NMFS or both agencies provided a section 10 permit, the field office/regional office(s) providing permit(s), any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the permit was granted.

- ✓ Agency providing section 10 permit: ☐USFWS ☐NMFS
- ✓ Field/regional office(s) providing permit: N/A
- ✓ Tracking numbers associated with consultation: N/A
- ✓ Date permit granted: N/A
- ✓ Attach copies of any letters or other communication between you and the U.S. Fish & Wildlife Service or National Marine Fisheries Service.

3.2 Historic Preservation

Instructions (see CGP Part 1.1.6, 7.2.9.b, Appendix E, and the "Historic Preservation" section of the Appendix J – NOI form):

Follow the screening process in Appendix E of the permit for determining whether your installation of subsurface earth-disturbing stormwater controls will have an effect on historic properties.

- Include documentation supporting your determination of eligibility.
- To contact your applicable state or tribal historic preservation office, information is available at *www.achp.gov/programs/html*.

Appendix E, Step 1

Do you plan on installing any of the following stormwater controls at your site? Check all that apply below, and proceed to Appendix E, Step 2.

- ☐ Dike
- ☐ Berm
- ☒ Catch Basin
- ☐ Pond
- ☒ Stormwater Conveyance Channel (e.g., ditch, trench, perimeter drain, swale, etc.)
- ☒ Culvert
- ☐ Other type of ground-disturbing stormwater control: N/A

(Note: If you will not be installing any ground-disturbing stormwater controls, no further documentation is required for Section 3.2 of the Template.)

Appendix E, Step 2

If you answered yes in Step 1, have prior surveys or evaluations conducted on the site already determined that historic properties do not exist, or that prior disturbances at the site have precluded the existence of historic properties? ☒ YES ☐ NO

- If yes, no further documentation is required for Section 3.2 of the Template.
- If no, proceed to Appendix E, Step 3.

Appendix E, Step 3

If you answered no in Step 2, have you determined that your installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties? ☐ YES ☐ NO

If yes, provide documentation of the basis for your determination. N/A

If no, proceed to Appendix E, Step 4.

Appendix E, Step 4

If you answered no in Step 3, did the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Office (THPO), or other tribal representative (whichever applies) respond to you within 15 calendar days to indicate whether the subsurface earth disturbances caused by the installation of stormwater controls affect historic properties? ☐ YES ☐ NO

If no, no further documentation is required for Section 3.2 of the Template.

If yes, describe the nature of their response:

- ☐ Written indication that no historic properties will be affected by the installation of stormwater controls. N/A
- ☐ Written indication that adverse effects to historic properties from the installation of stormwater controls can be mitigated by agreed upon actions. N/A
- ☐ No agreement has been reached regarding measures to mitigate effects to historic properties from the installation of stormwater controls. N/A
- ☐ Other: N/A

3.3 Safe Drinking Water Act Underground Injection Control Requirements

Instructions (see CGP Part 7.2.9.c):

- If you will use any of the identified controls in this section, include documentation of contact between you and the applicable state agency or EPA Regional Office responsible for implementing the requirements for underground injection wells in the Safe Drinking Water Act and EPA's implementing regulations at 40 CFR Parts 144-147. \
- For state UIC program contacts, refer to the following EPA website: https://www.epa.gov/uic.

Do you plan to install any of the following controls? Check all that apply below.

- ☐ Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)
- ☐ Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow
- ☐ Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

N/A

SECTION 4: EROSION AND SEDIMENT CONTROLS

General Instructions (See CGP Parts 2.2 and 7.2.6):

- Describe the erosion and sediment controls that will be installed and maintained at your site.
- Describe any applicable stormwater control design specifications (including references to any manufacturer specifications and/or erosion and sediment control manuals/ordinances relied upon).
- Describe any routine stormwater control maintenance specifications.
- Describe the projected schedule for stormwater control installation/implementation.

4.1 Natural Buffers or Equivalent Sediment Controls

Instructions (see CGP Parts 2.2.1 and 7.2.6.b.i, and Appendix G):

This section only applies to you if a water of the U.S. is located within 50 feet of your site's earth disturbances. If this is the case, consult CGP Part 2.2.1 and Appendix G for information on how to comply with the buffer requirements.

- Describe the compliance alternative (CGP Part 2.2.1.a.i, ii, or iii) that was chosen to meet the buffer requirements, and include any required documentation supporting the alternative selected. The compliance alternative selected must be maintained throughout the duration of permit coverage. However, if you select a different compliance alternative during your period of permit coverage, you must modify your SWPPP to reflect this change.
- If you qualify for one of the exceptions in CGP Part 2.2.1.b, include documentation related to your qualification for such exceptions.

Buffer Compliance Alternatives

Are there any waters of the U.S. within 50 feet of your project's earth disturbances? ☐ YES ☒ NO

(Note: If no, no further documentation is required for Part 4.1 in the SWPPP Template. Continue on to Part 4.2.)

Check the compliance alternative that you have chosen:

☐ (i) I will provide and maintain a 50-foot undisturbed natural buffer.

(Note (1): You must show the 50-foot boundary line of the natural buffer on your site map.)

(Note (2): You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

☐ (ii) I will provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by additional erosion and sediment controls, which in combination achieves the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

(Note (1): You must show the boundary line of the natural buffer on your site map.)

(Note (2): You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

- INSERT WIDTH OF NATURAL BUFFER TO BE RETAINED
- INSERT EITHER ONE OF THE FOLLOWING:

  (1) THE ESTIMATED SEDIMENT REMOVAL FROM A 50-FOOT BUFFER USING APPLICABLE TABLES IN APP. G, ATTACHMENT 1. INCLUDE INFORMATION ABOUT THE BUFFER VEGETATION AND SOIL TYPE THAT PREDOMINATE AT YOUR SITE

  OR

  (2) IF YOU CONDUCTED A SITE-SPECIFIC CALCULATION FOR THE ESTIMATED SEDIMENT REMOVAL OF A 50-FOOT BUFFER, PROVIDE THE SPECIFIC REMOVAL EFFICIENCY, AND INFORMATION YOU RELIED UPON TO MAKE YOUR SITE-SPECIFIC CALCULATION.
- INSERT DESCRIPTION OF ADDITIONAL EROSION AND SEDIMENT CONTROLS TO BE USED IN COMBINATION WITH NATURAL BUFFER AREA
- INSERT THE FOLLOWING INFORMATION:
  - (1) SPECIFY THE MODEL OR OTHER TOOL USED TO ESTIMATE SEDIMENT LOAD REDUCTIONS FROM THE COMBINATION OF THE BUFFER AREA AND ADDITIONAL EROSION AND SEDIMENT CONTROLS INSTALLED AT YOUR SITE, AND
  - (2) INCLUDE THE RESULTS OF CALCULATIONS SHOWING THAT THE COMBINATION OF YOUR BUFFER AREA AND THE ADDITIONAL EROSION AND SEDIMENT CONTROLS INSTALLED AT YOUR SITE WILL MEET OR EXCEED THE SEDIMENT REMOVAL EFFICIENCY OF A 50-FOOT BUFFER

☐ (iii) It is infeasible to provide and maintain an undisturbed natural buffer of any size, therefore I will implement erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

- INSERT RATIONALE FOR CONCLUDING THAT IT IS INFEASIBLE TO PROVIDE AND MAINTAIN A NATURAL BUFFER OF ANY SIZE
- INSERT EITHER ONE OF THE FOLLOWING:

  (1) THE ESTIMATED SEDIMENT REMOVAL FROM A 50-FOOT BUFFER USING APPLICABLE TABLES IN APP. G, ATTACHMENT 1. INCLUDE INFORMATION ABOUT THE BUFFER VEGETATION AND SOIL TYPE THAT PREDOMINATE AT YOUR SITE

  OR

  (2) IF YOU CONDUCTED A SITE-SPECIFIC CALCULATION FOR THE ESTIMATED SEDIMENT REMOVAL OF A 50-FOOT BUFFER, PROVIDE THE SPECIFIC REMOVAL EFFICIENCY, AND INFORMATION YOU RELIED UPON TO MAKE YOUR SITE-SPECIFIC CALCULATION.
- INSERT DESCRIPTION OF ADDITIONAL EROSION AND SEDIMENT CONTROLS TO BE USED IN COMBINATION WITH NATURAL BUFFER AREA
- INSERT THE FOLLOWING INFORMATION:
  - (1) SPECIFY THE MODEL OR OTHER TOOL USED TO ESTIMATE SEDIMENT LOAD REDUCTIONS FROM THE EROSION AND SEDIMENT CONTROLS INSTALLED AT YOUR SITE, AND
  - (2) INCLUDE THE RESULTS OF CALCULATIONS SHOWING THAT THE ADDITIONAL EROSION AND SEDIMENT CONTROLS INSTALLED AT YOUR SITE WILL MEET OR EXCEED THE SEDIMENT REMOVAL EFFICIENCY OF A 50-FOOT BUFFER

☐ I qualify for one of the exceptions in Part 2.2.1.b. (If you have checked this box, provide information on the applicable buffer exception that applies, below.)

Buffer Exceptions

Which of the following exceptions to the buffer requirements applies to your site?

☐ There is no discharge of stormwater to the water of the U.S. that is located 50 feet from my construction disturbances.

(Note: If this exception applies, no further documentation is required for Section 4.1 of the Template.)

☐ No natural buffer exists due to preexisting development disturbances that occurred prior to the initiation of planning for this project.

(Note (1): If this exception applies, no further documentation is required for Section 4.1 of the Template.)

(Note (2): Where some natural buffer exists but portions of the area within 50 feet of the surface water are occupied by preexisting development disturbances, you must still comply with the one of the CGP Part 2.2.1.a compliance alternatives.)

☐ For a "linear construction sites" (defined in Appendix A), site constraints (e.g., limited right-of-way) make it infeasible to meet any of the CGP Part 2.2.1.a compliance alternatives. INCLUDE DOCUMENTATION HERE OF THE FOLLOWING: (1) WHY IT IS INFEASIBLE FOR YOU TO MEET ONE OF THE BUFFER COMPLIANCE ALTERNATIVES, AND (2) BUFFER WIDTH RETAINED AND/OR SUPPLEMENTAL EROSION AND SEDIMENT CONTROLS TO TREAT DISCHARGES TO THE SURFACE WATER

☐ The project qualifies as "small residential lot" construction (defined in Appendix A) (see Appendix G, Part G.3.2).

☐ For Alternative 1:

- INSERT WIDTH OF NATURAL BUFFER TO BE RETAINED
- INSERT APPLICABLE REQUIREMENTS BASED ON TABLE G-1
- INSERT DESCRIPTION OF HOW YOU WILL COMPLY WITH THESE REQUIREMENTS

☐ For Alternative 2:

- INSERT (1) THE ASSIGNED RISK LEVEL BASED ON APP. G APPLICABLE TABLE G-2 THROUGH G-6 AND (2) THE PREDOMINANT SOIL TYPE AND AVERAGE SLOPE AT YOUR SITE
- INSERT APPLICABLE REQUIREMENTS BASED ON APP. G, TABLE G-7
- INSERT DESCRIPTION OF HOW YOU WILL COMPLY WITH THESE REQUIREMENTS

☐ Buffer disturbances are authorized under a CWA Section 404 permit. INSERT DESCRIPTION OF ANY EARTH DISTURBANCES THAT WILL OCCUR WITHIN THE BUFFER AREA

(Note (1): If this exception applies, no further documentation is required for Section 4.1 of the Template.)

(Note (2): This exception only applies to the limits of disturbance authorized under the Section 404 permit, and does not apply to any upland portion of the construction project.)

☐ Buffer disturbances will occur for the construction of a water-dependent structure or water access area (e.g., pier, boat ramp, and trail). INSERT DESCRIPTION OF ANY EARTH DISTURBANCES THAT WILL OCCUR WITHIN THE BUFFER AREA

(Note (1): If this exception applies, no further documentation is required for Section 4.1 of the Template.)

4.2 Perimeter Controls

Instructions (see CGP Parts 2.2.3 and 7.2.6.b.ii):

- Describe sediment controls that will be used (e.g., silt fences, filter berms, temporary diversion dikes, or fiber rolls) to meet the Part 2.2.3 requirement to "install sediment controls along any perimeter areas of the site that will receive pollutant discharges."
- For linear projects, where you have determined that the use of perimeter controls in portions of the site is infeasible, document other practices that you will implement.

General

- Perimeter controls shall be placed downstream of pollutant generating activities.

Specific Perimeter Controls

Compost Filter Sock	
Description: A compost filter sock is mesh tube filled with composted material used to control sediment through settling and filtration.	
Installation	7/19/2021
Maintenance Requirements	Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Prevent vehicles and machinery from damaging sock. Remove accumulated sediment generally when it reaches half the height of the sock, replace broken stakes, and repair or replace torn sections. (Note: At a minimum, you must provide for maintenance that meets the following requirement in CGP 2.2.3.a:" Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control.")
Design Specifications	See Appendix N

Silt Fence	
Description: A silt fence consists of a run of filter fabric, stretched, trenched in the ground and attached to anchored posts and is used to encourage ponding of runoff and settling of sediment from stormwater when used as a perimeter control.	
Installation	7/19/2021
Maintenance Requirements	Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Remove sediment buildup once it accumulates to 6 inches. Replace torn or clogged fabric and repair loose fabric and broken stakes. (Note: At a minimum, you must provide for maintenance that meets the following requirement in CGP 2.2.3.a:" Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control.")
Design Specifications	See Appendix N

[Repeat as needed for individual perimeter controls.]

4.3 Sediment Track-Out

Instructions (see CGP Parts 2.2.4 and 7.2.6.b.iii):

- Describe stormwater controls that will be used to minimize sediment track-out.
- Describe location(s) of vehicle exit(s), procedures to remove accumulated sediment off-site (e.g., vehicle tracking), and stabilization practices (e.g., stone pads or wash racks or both) to minimize off-site vehicle tracking of sediment. Also include the design, installation, and maintenance specifications for each control.

General

- A construction entrance shall be installed prior to construction activities on site.

Specific Track-Out Controls

Construction Exit	
Description: A stabilized exit to a construction site is designed to minimize the amount of sediment tracked from the site on vehicles and equipment. Mud and sediment fall off of tires as they bounce along the stabilized entrance.	
Installation	7/19/2021
Maintenance Requirements	Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Add a new lift of rock, or turn stones when gaps between stones are filled with sediment. Immediately remove any mud, rock, or trash tracked onto paved surfaces. Use a street sweeper in conjunction with the construction exit to reduce track out from site. (Note: At a minimum, you must provide for maintenance that meets the following requirement in CGP Part 2.2.4.d: "Where sediment has been tracked-out from your site onto paved roads, sidewalks, or other paved areas outside of your site, remove the deposited sediment by the end of the same business day in which the track-out occurs or by the end of the next business day if track-out occurs on a non-business day. Remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. You are prohibited from hosing or sweeping tracked-out sediment into any stormwater conveyance, storm drain inlet, or water of the U.S.")
Design Specifications	See Appendix N

[Repeat as needed for individual track-out controls.]

4.4 Stockpiled Sediment or Soil

Instructions (see CGP Parts 2.2.5 and 7.2.6):

- Describe stormwater controls and other measures you will take to minimize the discharge of sediment or soil particles from stockpiled sediment or soil. Include a description of structural practices (e.g., diversions, berms, ditches, storage basins), including design, installation, and maintenance specifications, used to divert flows from stockpiled sediment or soil, retain or detain flows, or otherwise limit exposure and the discharge of pollutants from stockpiled sediment or soil.
- For piles that will be unused for 14 or more days, describe what cover or other appropriate temporary stabilization will be used.
- Also, describe any controls or procedures used to minimize exposure resulting from adding to or removing materials from the pile.

General

- Perimeter controls shall be placed on the downgradient ends of the stockpiled material.

Specific Stockpile Controls

Compost Filter Sock	
Description: See Section 4.2	
Installation	7/19/2021
Maintenance Requirements	See Section 4.2. (Note: At a minimum, you must comply with following requirement in CGP Part 2.2.5.d: "You are prohibited from hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the U.S.")
Design Specifications	See Appendix N

[Repeat as needed for individual stockpile controls.]

4.5 Minimize Dust

Instructions (see CGP Parts 2.2.6 and 7.2.6):

Describe controls and procedures you will use at your site to minimize the generation of dust.

General

- Contractor to utilize watering procedures to minimize dust as required. Runoff from these procedures will be protected by downgradient perimeter controls as specified in section 4.2.

Specific Dust Controls

Dust Control/Watering Practices	
Description: Apply water by means of pressure-type distributors equipped with a nozzle that will ensure even distribution.	
Installation	As Required
Maintenance Requirements	N/A

Design Specifications	See Appendix N

[Repeat as needed for individual dust controls.]

4.6 Minimize Steep Slope Disturbances

Instructions (see CGP Parts 2.2.7 and 7.2.6):

- Describe how you will minimize the disturbance to steep slopes (as defined by CGP Appendix A).
- Describe controls (e.g., erosion control blankets, tackifiers), including design, installation and maintenance specifications, that will be implemented to minimize sediment discharges from slope disturbances.

General

- The steepest slope allowed on the project site post-construction is a 3:1 slope.

Specific Steep Slope Controls

Erosion Control Blanket	
Description: An erosion control blanket (ECB) is a blanket of synthetic or natural fibers to protect soil from the erosive impact of precipitation and overland flow, typically on slopes and in channels. ECBs also retain moisture and facilitate establishment of vegetation. Erosion control blankets are also sometimes referred to as Rolled Erosion Control Products (RECPs).	
Installation	ECBs should be installed immediately after completion of a phase of grading and/or seeding.
Maintenance Requirements	Inspect every week and withing 48 hours after every rain event that causes stormwater runoff to occur on-site until adequate vegetation is established. Repair erosion and/or undermining at top of slope. Repair undermining beneath blankets. Pull back the blankets, fill and compact eroded area, re-seed and then firmly secure the blankets. Reposition or replace blankets that have moved along the slope or have been damaged.
Design Specifications	See Appendix N

[Repeat as needed for individual steep slope controls.]

4.7 Topsoil

Instructions (see CGP Parts 2.2.8 and 7.2.6):

- Describe how topsoil will be preserved and identify these areas and associated control measures on your site map(s).
- If it is infeasible for you to preserve topsoil on your site, provide an explanation for why this is the case.

General

- Topsoil will be stripped and stockpiled for reuse.

Specific Topsoil Controls

Compost Filter Sock	
Description: See Section 4.2	
Installation	8/1/2021
Maintenance Requirements	See Section 4.2
Design Specifications	See Appendix N

[Repeat as needed for individual topsoil controls.]

4.8 Soil Compaction

Instructions (see CGP Parts 2.2.9 and 7.2.6):

- In areas where final vegetative stabilization will occur or where infiltration practices will be installed, describe the controls, including design, installation, and maintenance specifications that will be used to restrict vehicle or equipment access or condition the soil for seeding or planting.

General

- Contractor shall take care to minimize vehicle or equipment traffic in areas to receive seeding for final stabilization

Specific Soil Compaction Controls

N/A	
Description: N/A	
Installation	N/A
Maintenance Requirements	N/A
Design Specifications	N/A

[Repeat as needed for individual soil compaction controls.]

4.9 Storm Drain Inlets

Instructions (see CGP Parts 2.2.10 and 7.2.6):

- Describe controls (e.g., inserts, rock-filled bags, or block and gravel) including design, installation, and maintenance specifications that will be implemented to protect all inlets that carry stormwater flow from your site to a water of the U.S., provided you have the authority to access the storm drain inlet.

General

- Inlet protection to be placed following installation of stormwater inlets. Contractor to ensure that protection is functioning properly and clear sediment as necessary.

Specific Storm Drain Inlet Controls

Gravel Bags	
Description: Open mesh nylon or burlap bags of gravel to slow runoff flow and allow sediment to settle out.	
Installation	8/1/2021
Maintenance Requirements	Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Replace or stabilize any damaged bags. Repair as needed. Remove sediment when accumulation reaches half the height of the gravel bags. (Note: At a minimum, you must comply with following requirement in CGP Part 2.2.10.b: "Clean, or remove and replace the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible.")
Design Specifications	See Appendix N

[Repeat as needed for individual storm drain inlet controls.]

4.10 Stormwater Conveyance Channels

Instructions (see CGP Parts 2.2.11 and 7.2.6):

If you will be installing a stormwater conveyance channel, describe control practices (e.g., velocity dissipation devices), including design specifications and details (volume, dimensions, outlet structure), that will be implemented at the construction site.

General

- The outlet of the proposed stormwater conveyance system will be protected with permanent rip rap energy dissipators.

Specific Conveyance Channel Controls

Rip-Rap Outlet Protection	
Description: An apron lined with rip-rap energy dissipators at the outlet of the stormwater conveyance channel shall serve to slow the discharging stormwater to prevent erosion downstream.	
Installation	8/31/2021
Maintenance Requirements	Inspect annually, removing accumulated sediment as necessary.
Design Specifications	N/A

[Repeat as needed for individual stormwater conveyance channel controls.]

4.11 Sediment Basins

Instructions (see CGP Parts 2.2.12 and 7.2.6.b.iv):

If you will install a sediment basin, include design specifications and other details (volume, dimensions, outlet structure) that will be implemented in conformance with CGP Part 2.2.12.

- Sediment basins must be situated outside waters of the U.S. and any natural buffers established under CGP Part 2.2.1; and designed to avoid collecting water from wetlands.
- At a minimum, sediment basins provide storage for either (1) the calculated volume of runoff from the 2-year, 24-hour storm (see CGP App. H), or (2) 3,600 cubic feet per acre drained
- Sediment basins must also utilize outlet structures that withdraw water from the surface, unless infeasible

General

- N/A

Specific Sediment Basin Controls

N/A	
Description: N/A	
Installation	N/A
Maintenance Requirements	N/A (Note: At a minimum, you must comply with following requirement in CGP Part 2.2.12.f: "Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition.")
Design Specifications	N/A

[Repeat as needed for individual sediment basin controls.]

4.12 Chemical Treatment

Instructions (see CGP Parts 2.2.13 and 7.2.6.v):

If you are using treatment chemicals at your site, provide details for each of the items below. This information is required as part of the SWPPP requirements in CGP Part 7.2.6.v.

Soil Types

List all the soil types (including soil types expected to be found in fill material) that are expected to be exposed during construction in areas of the project that will drain to chemical treatment systems: INSERT TEXT HERE

Treatment Chemicals

List all treatment chemicals that will be used at the site and explain why these chemicals are suited to the soil characteristics: INSERT TEXT HERE

Describe the dosage of all treatment chemicals you will use at the site or the methodology you will use to determine dosage: INSERT TEXT HERE

Provide information from any applicable Safety Data Sheets (SDS): INSERT TEXT HERE

Describe how each of the chemicals will stored: INSERT TEXT HERE

Include references to applicable state or local requirements affecting the use of treatment chemicals, and copies of applicable manufacturer's specifications regarding the use of your specific treatment chemicals and/or chemical treatment systems: INSERT TEXT HERE

Special Controls for Cationic Treatment Chemicals (if applicable)
If the applicable EPA Regional Office authorized you to use cationic treatment chemicals, include the official EPA authorization letter or other communication, and identify the specific controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to an exceedance of water quality standards: INSERT (1) ANY LETTERS OR OTHER DOCUMENTS SENT FROM THE EPA REGIONAL OFFICE CONCERNING YOUR USE OF CATIONIC TREATMENT CHEMICALS, AND (2) DESCRIPTION OF ANY SPECIFIC CONTROLS YOU ARE REQUIRED TO IMPLEMENT

Schematic Drawings of Stormwater Controls/Chemical Treatment Systems
Provide schematic drawings of any chemically-enhanced stormwater controls or chemical treatment systems to be used for application of treatment chemicals: INSERT DRAWINGS HERE

Training
Describe the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to the use of treatment chemicals: INSERT TEXT HERE

4.13 Dewatering Practices

Instructions (see CGP Parts 2.4 and 7.2.6):

If you will be discharging ground water or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation, include design specifications and details of all dewatering practices that are installed and maintained to comply with CGP Part 2.4.

General

- It is not anticipated that dewatering practices will be necessary for this project.

Specific Dewatering Practices

Dewatering Operations	
Description: Dewatering operations are practices using dewatering bags or suction pump with skimmer to manage the discharge of pollutants when water must be removed from the site. Water must be diverted through a sediment control BMP before being released to storm sewer system or any surface waters.	
Installation	As Required
Maintenance Requirements	N/A (Note: At a minimum, you must comply with following requirement in CGP Part 2.4: "With backwash water, either haul it away for disposal or return it to the beginning of the treatment process; and replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.")
Design Specifications	See Appendix N

[Repeat as needed for individual dewatering practices.]

4.14 Other Stormwater Controls

Instructions:

– Describe any other stormwater controls that do not fit into the above categories.

General

- N/A

Specific Stormwater Control Practices

N/A	
Description: N/A	
Installation	N/A
Maintenance Requirements	N/A
Design Specifications	N/A

[Repeat as needed.]

4.15 Site Stabilization

Instructions (see CGP Parts 2.2.14 and 7.2.6.vi):

The CGP requires you to immediately initiate stabilization when work in an area of your site has permanently or temporarily stopped, and to complete certain stabilization activities within prescribed deadlines. Construction projects disturbing more than 5 acres at any one time have a different deadline than projects disturbing 5 acres or less at any one time. See CGP Part 2.2.14.a. The CGP also requires that stabilization measures meet certain minimum criteria. See CGP Part 2.2.14.b. For your SWPPP, you must include the following:

– Describe the specific vegetative and/or non-vegetative practices that will be used to stabilize exposed soils where construction activities have temporarily or permanently ceased. Avoid using impervious surfaces for stabilization whenever possible.
– The stabilization deadline(s) that will be met in accordance with Part 2.2.14.a
– Once you begin construction, consider using the Grading/Stabilization Activities log in Appendix H of the Template to document your compliance with the stabilization requirements in CGP Part 2.2.14.

Total Amount of Land Disturbance Occurring at Any One Time

☒ *Five Acres or less*

☐ *More than Five Acres*

Use this template box if you are <u>not</u> located in an arid, semi-arid, or drought-stricken area

Seeding	
☒ *Vegetative* ☐ *Non-Vegetative* ☐ *Temporary* ☒ *Permanent*	
Description: ▪ INSERT DESCRIPTION OF STABILIZATION PRACTICE TO BE INSTALLED ▪ NOTE HOW DESIGN WILL MEET REQUIREMENTS OF PART 2.2.14.b	
Installation	Immediately After Final Grading Has Been Completed
Completion	8/1/2022
Maintenance Requirements	See Appendix N
Design Specifications	See Appendix N

Mulching	
☐ *Vegetative* ☒ *Non-Vegetative* ☐ *Temporary* ☒ *Permanent*	
Description: ▪ INSERT DESCRIPTION OF STABILIZATION PRACTICE TO BE INSTALLED ▪ NOTE HOW DESIGN WILL MEET REQUIREMENTS OF PART 2.2.14.b	
Installation	Immediately After Final Grading Has Been Completed
Completion	8/1/2022
Maintenance Requirements	See Appendix N
Design Specifications	See Appendix N

[Repeat as needed for additional stabilization practices.]

Use this template box if you are located in an arid, semi-arid, or drought-stricken area.

N/A	
☐ *Vegetative* ☐ *Non-Vegetative* ☐ *Temporary* ☐ *Permanent*	
Description: ▪ N/A ▪ N/A	
Dry Period	▪ Beginning date of seasonally dry period: N/A ▪ Ending date of seasonally dry period: N/A ▪ Site conditions during this period: N/A
Installation and completion schedule	N/A ▪ Approximate installation date: N/A ▪ Approximate completion date: N/A
Maintenance Requirements	N/A
Design Specifications	N/A

[Repeat as needed for additional stabilization practices.]

Use this template box if unforeseen circumstances have delayed the initiation and/or completion of vegetative stabilization. Note: You will not be able to include this information in your initial SWPPP. If you

are affected by circumstances such as those described in CGP Part 2.2.14.a.iii, you will need to modify your SWPPP to include this information.

☐ *Vegetative* ☐ *Temporary* ☐ *Permanent*	
Description: ▪ ▪	
Justification	
Installation and completion schedule	**Vegetative Measures:** ▪ Approximate installation date: ▪ Approximate completion date:
	Non-Vegetative Measures: *(must be completed within 14 days of the cessation of construction if disturbing 5 acres or less; within 7 days if disturbing more than 5 acres)* ▪ Approximate installation date: ▪ Approximate completion date:
Maintenance Requirements	
Design Specifications	

[Repeat as needed for additional stabilization practices.]

SECTION 5: POLLUTION PREVENTION STANDARDS

5.1 Potential Sources of Pollution

Instructions (see CGP Part 7.2.3.g):

- Identify and describe all pollutant-generating activities at your site (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal).
- For each pollutant-generating activity, include an inventory of pollutants or pollutant constituents associated with that activity (e.g., sediment, fertilizers, and/or pesticides, paints, solvents, fuels), which could be exposed to rainfall or snowmelt, and could be discharged from your construction site. You must take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed or removed during construction.

Construction Site Pollutants

Pollutant-Generating Activity	**Pollutants or Pollutant Constituents** (that could be discharged if exposed to stormwater)	**Location on Site** (or reference SWPPP site map where this is shown)
Topsoil Stockpiles	Sediment	Upstream of Perimeter Controls
Waste Disposal	Paints, Solvents, Fuels	Determined by Contractor
Solid Waste Disposal	Paints, Metals, Debris, Trash	Determined by Contractor
Equipment Washing	Paints, Solvents, Fuels	Upstream of Perimeter Controls
Dust Watering	Sediment	Upstream of Perimeter Controls
Site Grading	Sediment	Upstream of Perimeter Controls
Onsite Petroleum Storage	Petroleum Based Pollutants	Determined by Contractor

[Include additional rows as necessary.]

5.2 Spill Prevention and Response

Instructions (see CGP Parts 2.3.6 and 7.2.6.vii):

- Describe procedures you will use to prevent and respond to leaks, spills, and other releases. You must implement the following at a minimum:
  - ✓ Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or title of the employee(s) responsible for detection and response of spills or leaks; and
  - ✓ Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.6 and established under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, occurs during a 24-hour period. Contact information must be in locations that are readily accessible and available.
- Some projects/site may be required to develop a Spill Prevention Control and Countermeasure (SPCC) plan under a separate regulatory program (40 CFR 112). If you are required to develop an SPCC plan, or you already have one, you should include references to the relevant requirements from your plan.

See Appendix M

5.3 Fueling and Maintenance of Equipment or Vehicles

Instructions (see CGP Parts 2.3.1 and 7.2.6):

- Describe equipment/vehicle fueling and maintenance practices that will be implemented to eliminate the discharge of spilled or leaked chemicals (e.g., providing secondary containment *(examples: spill berms, decks, spill containment pallets)* and cover where appropriate, and/or having spill kits readily available.)

General

- The Contractor shall take necessary steps to provide an effective means of eliminating the discharge of spilled or leaked chemicals, including fuel, from the area where these activities take place.

Specific Pollution Prevention Practices

Pollution Prevention Practice #1	
Description: All fueling and maintenance practices shall take place upstream of perimeter controls.	
Installation	N/A
Maintenance Requirements	N/A
Design Specifications	N/A

[Repeat as needed.]

5.4 Washing of Equipment and Vehicles

Instructions (see CGP Parts 2.3.2 and 7.2.6):

- Describe equipment/vehicle washing practices that will be used to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of wash waters (e.g., locating activities away from waters of the U.S. and stormwater inlets or conveyances and directing wash waters to a sediment basin or sediment trap, using filtration devices, such as filter bags or sand filters, or using other similarly effective controls).
- Describe how you will prevent the discharge of soaps, detergents, or solvents by providing either (1) cover (*examples: plastic sheeting or temporary roofs*) to prevent these detergents from coming into contact with rainwater, or (2) a similarly effective means designed to prevent the discharge of pollutants from these areas.

General

- Contractor to ensure that equipment and vehicle washing shall occur upstream of perimeter controls; it is not anticipated that soaps, detergents, or solvents will be utilized during washing procedures.

Specific Pollution Prevention Practices

Pollution Prevention Practice #2	
Description: All washing practices are to take place upstream of perimeter controls.	
Installation	N/A
Maintenance Requirements	N/A
Design Specifications	N/A

[Repeat as needed.]

5.5 Storage, Handling, and Disposal of Building Products, Materials, and Wastes

Instructions (see CGP Parts 2.3.3 and 7.2.6):

- For any of the types of building products, materials, and wastes below in Sections 5.5.1-5.5.6 below that you expect to use or store at your site, provide the information on how you will comply with the corresponding CGP provision and the specific practices that you will be employ.

5.5.1 Building Products

(Note: Examples include asphalt sealants, copper flashing, roofing materials, adhesives, concrete admixtures, and gravel and mulch stockpiles.)

General

- Contractor shall be responsible for disposing of solid waste materials in a proper fashion, such as securing a dumpster service for the site, or removing the waste himself.

Specific Pollution Prevention Practices

Pollution Prevention Practice #3	
Description: Contractor is responsible for proper disposal of solid waste materials.	
Installation	7/19/2021
Maintenance Requirements	**N/A**
Design Specifications	N/A

[Repeat as needed.]

5.5.2 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

General

- It is not anticipated that pesticides, herbicides, etc. will be utilized on this project.

Specific Pollution Prevention Practices

N/A	
Description: N/A	
Installation	N/A
Maintenance Requirements	N/A
Design Specifications	N/A

[Repeat as needed.]

5.5.3 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

General

- Contractor will be responsible for storing petroleum products in a proper fashion and shall take care to minimize spills and leaks.

Specific Pollution Prevention Practices

N/A	
Description: N/A	
Installation	N/A
Maintenance Requirements	N/A
Design Specifications	N/A

[Repeat as needed.]

5.5.4 Hazardous or Toxic Waste

(Note: Examples include paints, solvents, petroleum-based products, wood preservatives, additives, curing compounds, acids.)

General

- It is not anticipated that hazardous or toxic waste will be encountered during this project.

Specific Pollution Prevention Practices

N/A	
Description: N/A	
Installation	N/A
Maintenance Requirements	N/A
Design Specifications	N/A

[Repeat as needed.]

5.5.5 Construction and Domestic Waste

(Note: Examples include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, and other trash or building materials.)

General

- The contractor will be responsible to remove all construction waste materials from the site or to secure a dumpster service to temporarily store construction waste materials on site.

Specific Pollution Prevention Practices

INSERT NAME OF POLLUTION PREVENTION PRACTICE	
Description: INSERT DESCRIPTION OF PRACTICE TO BE INSTALLED	
Installation	INSERT APPROXIMATE DATE OF INSTALLATION
Maintenance Requirements	INSERT MAINTENANCE REQUIREMENTS FOR THE POLLUTION PREVENTION PRACTICE
Design Specifications	IF APPLICABLE INCLUDE COPIES OF DESIGN SPECIFICATIONS HERE

[Repeat as needed.]

5.5.6 Sanitary Waste

General

- INSERT GENERAL DESCRIPTION OF HOW YOU WILL COMPLY WITH CGP PART 2.3.3.f

Specific Pollution Prevention Practices

INSERT NAME OF POLLUTION PREVENTION PRACTICE	
Description: INSERT DESCRIPTION OF PRACTICE TO BE INSTALLED	
Installation	INSERT APPROXIMATE DATE OF INSTALLATION
Maintenance Requirements	INSERT MAINTENANCE REQUIREMENTS FOR THE POLLUTION PREVENTION PRACTICE
Design Specifications	IF APPLICABLE INCLUDE COPIES OF DESIGN SPECIFICATIONS HERE

[Repeat as needed.]

5.6 Washing of Applicators and Containers used for Paint, Concrete or Other Materials

Instructions (see CGP Parts 2.3.4 and 7.2.6):

- Describe how you will comply with the CGP Part 2.3.4 requirement for washing applications and containers.

General

- Any applicators and containers used for concrete or other materials should by washed within the concrete wash-out pit and upstream of perimeter controls.

Specific Pollution Prevention Practices

Concrete Wash-out Pit	
Description: Concrete wash-out pits are used to contain concrete wash-out when truck chutes, drums and/or hoses are rinsed out after delivery to construction site. Concrete wash-out management prevents the contamination of stormwater with high pH and additives that may cause adverse impact to water quality.	
Installation	Install concrete wash-out pits prior to concrete pouring activities.
Maintenance Requirements	Inspect every week and withing 48 hours after a rain event that causes stormwater runoff to occur on-site. Remove and dispose of solid concrete material. Wash-out facilities must be cleaned when volume reaches 75% of capacity. Cover the concrete wash-out pit before predicted rain events to prevent overflow.
Design Specifications	See Appendix N

[Repeat as needed.]

5.7 Fertilizers

Instructions (CGP Parts 2.3.5 and 7.2.6.ix):

Describe how you will comply with the CGP Part 2.3.5 requirement for the application of fertilizers.

General

- All areas receiving fertilizer shall be protected by the perimeter controls outlined in Section 4.2.

Specific Pollution Prevention Practices

INSERT NAME OF POLLUTION PREVENTION PRACTICE	
Description: Fertilizers containing nitrogen will be utilized to establish sufficient grass growth on the project site.	
Installation	7/29/2022
Maintenance Requirements	Wash off of fertilizers from storm events shall be contained by the perimeter controls on the project. Perimeter controls shall be properly maintained as outlined in Section 4.2.
Design Specifications	N/A

[Repeat as needed for individual fertilizer practices.]

5.8 Other Pollution Prevention Practices

Instructions:

Describe any additional pollution prevention practices that do not fit into the above categories.

General

- N/A

Specific Pollution Prevention Practices

N/A	
Description: N/A	
Installation	N/A
Maintenance Requirements	**N/A**
Design Specifications	N/A

[Repeat as needed.]

SECTION 6: INSPECTION, MAINTENANCE, AND CORRECTIVE ACTION

6.1 Inspection Personnel and Procedures

Instructions (see CGP Parts 3.2, 4, 5, and 7.2.7):

Describe the procedures you will follow for conducting inspections in accordance with CGP Parts 3.2, 4, 5, and 7.2.7.

Personnel Responsible for Inspections

The Contractor shall designate a 'qualified person' to conduct inspections as outline below.

Note: All personnel conducting inspections must be considered a "qualified person." CGP Part 4.1 clarifies that a "qualified person" is a person knowledgeable in the principles and practices of erosion and sediment controls and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Inspection Schedule

Select the inspection frequency(ies) that applies, based on CGP Parts 4.2, 4.3, or 4.4

(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply)

Standard Frequency:

☒ Every 7 days

☐ Every 14 days and within 24 hours of a 0.25" rain or the occurrence of runoff from snowmelt sufficient to cause a discharge

Increased Frequency (if applicable):

For areas of sites discharging to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3

☐ Every 7 days and within 24 hours of a 0.25" rain

Reduced Frequency (if applicable)

For stabilized areas

☐ Twice during first month, no more than 14 calendar days apart; then once per month after first month;

- N/A
- N/A

(Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information.)

For stabilized areas on "linear construction sites"

☐ Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of a 0.25" rain

- N/A
- N/A

(Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information.)

For arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought

☐ Once per month and within 24 hours of a 0.25" rain

Insert beginning and ending dates of the seasonally-defined dry period for your area or the valid period of drought:

- Beginning date of seasonally dry period: N/A
- Ending date of seasonally dry period: N/A

For frozen conditions where earth-disturbing activities are being conducted

☐ Once per month

Insert beginning and ending dates of frozen conditions on your site:

- Beginning date of frozen conditions: N/A
- Ending date of frozen conditions: N/A

Rain Gauge Location (if applicable)
N/A

Inspection Report Forms
See Appendix D

(Note: EPA has developed a sample inspection form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

6.2 *Corrective Action*

Instructions (CGP Parts 5 and 7.2.7):

- Describe the procedures for taking corrective action in compliance with CGP Part 5.

Personnel Responsible for Corrective Actions

The Contractor will be responsible for all corrective actions as required.

Corrective Action Forms

INSERT A COPY OF ANY CORRECTIVE ACTION FORMS YOU WILL USE HERE OR IN APPENDIX E OF THIS SWPPP TEMPLATE

(Note: EPA has developed a sample corrective action form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

6.3 *Delegation of Authority*

Instructions:

- Identify the individual(s) or positions within the company who have been delegated authority to sign inspection reports.
- Attach a copy of the signed delegation of authority (see example in Appendix J of the Template.)
- For more on this topic, see Appendix I, Subsection 11 of EPA's CGP.

Duly Authorized Representative(s) or Position(s):

Insert Company or Organization Name
Insert Name
Insert Position
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email

SECTION 7: TRAINING

Instructions (see CGP Part 6 and 7.2.8):

- Complete the table below to provide documentation that the personnel required to be trained in CGP Part 6 completed the appropriate training
- If personnel will be taking course training (which is not required as part of the CGP), consider using Appendix I of this SWPPP template to track completion of this training
- The following personnel, at a minimum, must receive training, and therefore should be listed out individually in the table below:
  - ✓ Personnel who are responsible for the design, installation, maintenance, and/or repair of stormwater controls (including pollution prevention measures);
  - ✓ Personnel responsible for the application and storage of treatment chemicals (if applicable);
  - ✓ Personnel who are responsible for conducting inspections as required in Part 4.1; and
  - ✓ Personnel who are responsible for taking corrective actions as required in Part 5.
- CGP Part 6 requires that the required personnel must be trained to understand the following if related to the scope of their job duties:
  - ✓ The permit deadlines associated with installation, maintenance, and removal of stormwater controls and with stabilization;
  - ✓ The location of all stormwater controls on the site required by this permit, and how they are to be maintained;
  - ✓ The proper procedures to follow with respect to the permit's pollution prevention requirements; and
  - ✓ When and how to conduct inspections, record applicable findings, and take corrective actions.

Table 7-1: Documentation for Completion of Training

Name	Describe Training	Date Training Completed

SECTION 8: CERTIFICATION AND NOTIFICATION

Instructions (CGP Appendix I, Part I.11.b):

- The following certification statement must be signed and dated by a person who meets the requirements of Appendix I, Part I.11.b.
- This certification must be re-signed in the event of a SWPPP Modification.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____ Title: _____

Signature: _____ Date: _____

[Repeat as needed for multiple construction operators at the site.]

SWPPP APPENDICES

Attach the following documentation to the SWPPP:

Appendix A – Site Maps

Appendix B – Copy of 2017 CGP
(Note: The 2017 CGP is available at https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents)

Appendix C – NOI and EPA Authorization Email

Appendix D – Inspection Form
(Note: EPA has developed a sample inspection form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

Appendix E – Corrective Action Form
(Note: EPA has developed a sample corrective action form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

Appendix F – SWPPP Amendment Log

Appendix G – Subcontractor Certifications/Agreements

Appendix H – Grading and Stabilization Activities Log

Appendix I – Training Log

Appendix J – Delegation of Authority

Appendix K – Endangered Species Documentation

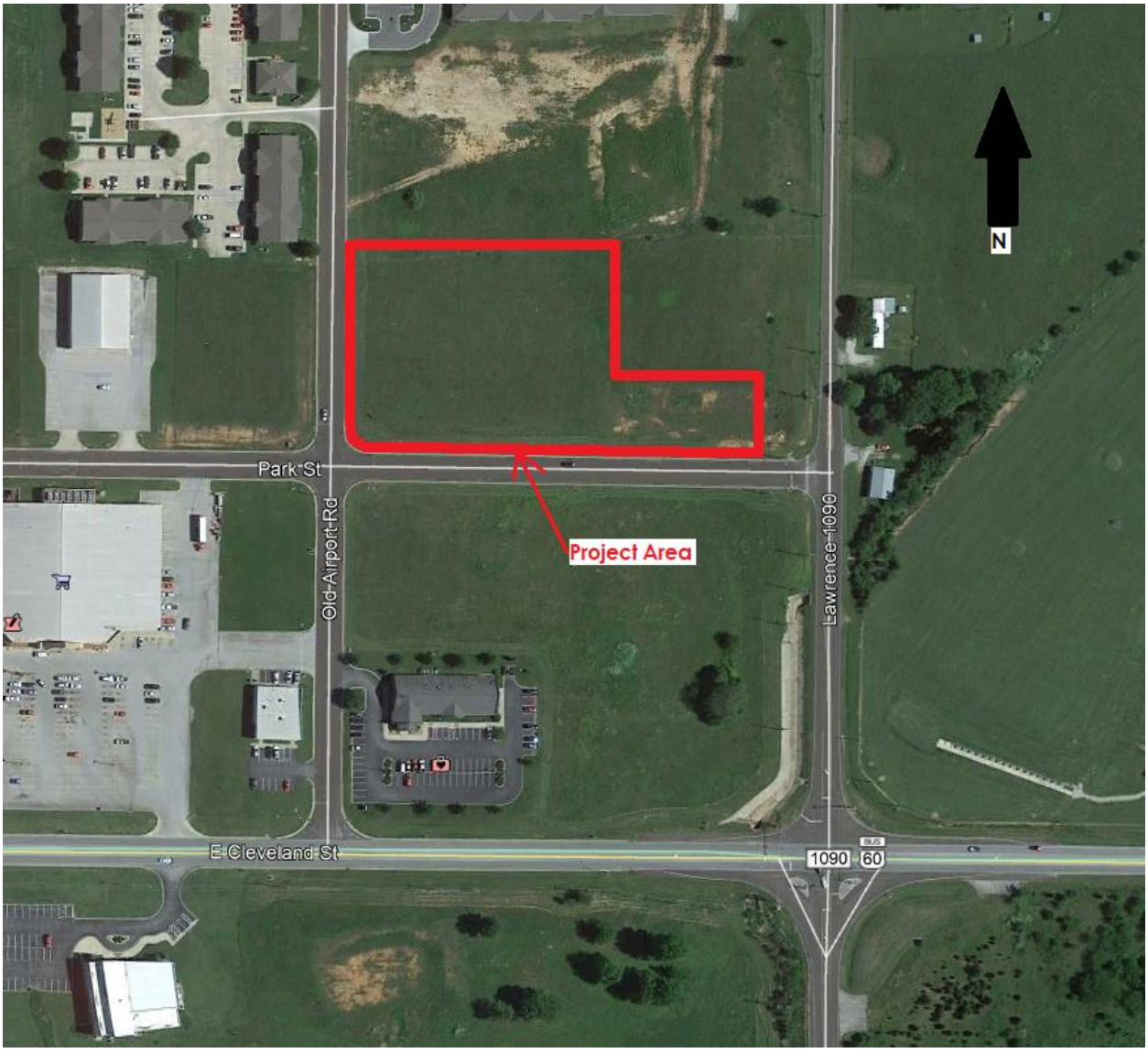
Appendix L – Historic Preservation Documentation

Appendix M – Rainfall Gauge Recording

Appendix N – Best Management Practices

Appendix A – Site Maps

See attached maps.


N
Park St
Old-Airport-Rd
Project Area
Lawrence-1090
E Cleveland St
1090
60

Appendix B – Copy of 2017 CGP

(Note: The 2017 CGP is available at https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents)

National Pollutant Discharge Elimination System
General Permit for Discharges from
Construction Activities
(as modified)

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 et. seq., (hereafter CWA), as amended by the Water Quality Act of 1987, P.L. 100-4, "operators" of construction activities (defined in Appendix A) that meet the requirements of Part 1.1 of this National Pollutant Discharge Elimination System (NPDES) general permit, are authorized to discharge pollutants in accordance with the effluent limitations and conditions set forth herein. Permit coverage is required from the "commencement of construction activities" (see Appendix A) until one of the conditions for terminating CGP coverage has been met (see Part 8.2).

This permit becomes effective on **June 27, 2019**.

This permit and the authorization to discharge expire at 11:59pm, **February 16, 2022.**

Signed and issued this 14th day of May 2019

Deborah Szaro,
Acting Regional Administrator, EPA Region 1.

Signed and issued this 14th day of May 2019

Jeff Gratz,
Deputy Director, Water Division, EPA Region 2.

Signed and issued this 14th day of May 2019

Jose C. Font,
Acting Director, Caribbean Environmental Protection Division, EPA Region 2.

Signed and issued this 14th day of May 2019

Catharine McManus,
Deputy Director, Water Division, EPA Region 3.

Signed and issued this 14th day of May 2019

Jeaneanne M. Gettle,
Director, Water Division, EPA Region 4.

Signed and issued this 14th day of May 2019

Joan M. Tanaka,
Acting Director, Water Division, EPA Region 5.

Signed and issued this 14th day of May 2019

Charles W. Maguire,
Director, Water Division, EPA Region 6.

Signed and issued this 14th day of May 2019

Jeffery Robichaud,
Director, Water Division, EPA Region 7.

Signed and issued this 14th day of May 2019

Darcy O'Connor,
Director, Water Division, EPA Region 8.

Signed and issued this 14th day of May 2019

Tomás Torres,
Director, Water Division, EPA Region 9.

Signed and issued this 14th day of May 2019

Daniel D. Opalski,
Director, Water Division, EPA Region 10.

CONTENTS

1 HOW TO OBTAIN COVERAGE UNDER THE CONSTRUCTION GENERAL PERMIT (CGP)

To be covered under this permit, you must meet the eligibility conditions and follow the requirements for obtaining permit coverage in this Part.

1.1 ELIGIBILITY CONDITIONS

1.1.1 You are an "operator" of a construction site for which discharges will be covered under this permit. For the purposes of this permit and in the context of stormwater discharges associated with construction activity, an "operator" is any party associated with a construction project that meets either of the following two criteria:

a. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

b. The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions.

Where there are multiple operators associated with the same project, all operators must obtain permit coverage.[1] Subcontractors generally are not considered operators for the purposes of this permit.

1.1.2 Your site's construction activities:

a. Will disturb one or more acres of land, or will disturb less than one acre of land but are part of a common plan of development or sale that will ultimately disturb one or more acres of land; or

b. Have been designated by EPA as needing permit coverage under 40 CFR 122.26(a)(1)(v) or 40 CFR 122.26(b)(15)(ii);

1.1.3 Your site is located in an area where EPA is the permitting authority (see Appendix B);

1.1.4 Discharges from your site are not:

a. Already covered by a different NPDES permit for the same discharge; or

b. In the process of having coverage under a different NPDES permit for the same discharge denied, terminated, or revoked.[2, 3]

1.1.5 You are able to demonstrate that you meet one of the criteria listed in Appendix D with respect to the protection of species that are federally listed as endangered or threatened under the Endangered Species Act (ESA) and federally designated critical habitat;

1.1.6 You have completed the screening process in Appendix E relating to the protection of historic properties; and

[1] If the operator of a "construction support activity" (see Part 1.2.1c) is different than the operator of the main site, that operator must also obtain permit coverage. See Part 7.1 for clarification on the sharing of permit-related functions between and among operators on the same site and for conditions that apply to developing a SWPPP for multiple operators associated with the same site.

[2] Parts 1.1.4a and 1.1.4b do not include sites currently covered under the 2012 CGP that are in the process of obtaining coverage under this permit, nor sites covered under this permit that are transferring coverage to a different operator.

[3] Notwithstanding a site being made ineligible for coverage under this permit because it falls under the description of Parts 1.1.4a or 1.1.4b, above, EPA may waive the applicable eligibility requirement after specific review if it determines that coverage under this permit is appropriate.

1.1.7 You have complied with all requirements in Part 9 imposed by the applicable state, Indian tribe, or territory in which your construction activities and/or discharge will occur.

1.1.8 For "new sources" (as defined in Appendix A) only:

a. EPA has not, prior to authorization under this permit, determined that discharges from your site will cause, have the reasonable potential to cause, or contribute to an excursion above any applicable water quality standard. Where such a determination is made prior to authorization, EPA may notify you that an individual permit application is necessary. However, EPA may authorize your coverage under this permit after you have included appropriate controls and implementation procedures designed to bring your discharge into compliance with this permit, specifically the requirement to meet water quality standards. In the absence of information demonstrating otherwise, EPA expects that compliance with the requirements of this permit, including the requirements applicable to such discharges in Part 3, will result in discharges that will not cause, have the reasonable potential to cause, or contribute to an excursion above any applicable water quality standard.

b. Discharges from your site to a Tier 2, Tier 2.5, or Tier 3 water[4] will not lower the water quality of the applicable water. In the absence of information demonstrating otherwise, EPA expects that compliance with the requirements of this permit, including the requirements applicable to such discharges in Part 3.2, will result in discharges that will not lower the water quality of such waters.

1.1.9 If you plan to add "cationic treatment chemicals" (as defined in Appendix A) to stormwater and/or authorized non-stormwater prior to discharge, you may not submit your Notice of Intent (NOI) unless and until you notify your applicable EPA Regional Office (see Appendix L) in advance and the EPA Regional Office authorizes coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to discharges that cause an exceedance of water quality standards.

1.2 TYPES OF DISCHARGES AUTHORIZED[5]

1.2.1 The following stormwater discharges are authorized under this permit provided that appropriate stormwater controls are designed, installed, and maintained (see Parts 2 and 3):

a. Stormwater discharges, including stormwater runoff, snowmelt runoff, and surface runoff and drainage, associated with construction activity under 40 CFR 122.26(b)(14) or 122.26(b)(15)(i);

b. Stormwater discharges designated by EPA as needing a permit under 40 CFR 122.26(a)(1)(v) or 122.26(b)(15)(ii);

[4] Note: Your site will be considered to discharge to a Tier 2, Tier 2.5, or Tier 3 water if the first water to which you discharge is identified by a state, tribe, or EPA as a Tier 2, Tier 2.5, or Tier 3 water. For discharges that enter a storm sewer system prior to discharge, the first water of the U.S. to which you discharge is the waterbody that receives the stormwater discharge from the storm sewer system. See list of Tier 2, Tier 2.5, and Tier 3 waters in Appendix F.

[5] See "Discharge" as defined in Appendix A. Note: Any discharges not expressly authorized in this permit cannot become authorized or shielded from liability under CWA section 402(k) by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including the Notice of Intent (NOI) to be covered by the permit, the SWPPP, or during an inspection.

c. Stormwater discharges from construction support activities *(e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas)* provided that:

   i. The support activity is directly related to the construction site required to have permit coverage for stormwater discharges;

   ii. The support activity is not a commercial operation, nor does it serve multiple unrelated construction sites;

   iii. The support activity does not continue to operate beyond the completion of the construction activity at the site it supports; and

   iv. Stormwater controls are implemented in accordance with Part 2 and Part 3 for discharges from the support activity areas.

d. Stormwater discharges from earth-disturbing activities associated with the construction of staging areas and the construction of access roads conducted prior to active mining.

1.2.2 The following non-stormwater discharges associated with your construction activity are authorized under this permit provided that, with the exception of water used to control dust and to irrigate vegetation in stabilized areas, these discharges are not routed to areas of exposed soil on your site and you comply with any applicable requirements for these discharges in Parts 2 and 3:

a. Discharges from emergency fire-fighting activities;

b. Fire hydrant flushings;

c. Landscape irrigation;

d. Water used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;

e. Water used to control dust;

f. Potable water including uncontaminated water line flushings;

g. External building washdown, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (as defined in Appendix A) *(e.g., paint or caulk containing polychlorinated biphenyls (PCBs)*);

h. Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. You are prohibited from directing pavement wash waters directly into any water of the U.S., storm drain inlet, or stormwater conveyance, unless the conveyance is connected to a sediment basin, sediment trap, or similarly effective control;

i. Uncontaminated air conditioning or compressor condensate;

j. Uncontaminated, non-turbid discharges of ground water or spring water;

k. Foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water; and

l. Construction dewatering water discharged in accordance with Part 2.4.

1.2.3 Also authorized under this permit are discharges of stormwater listed above in Part 1.2.1, or authorized non-stormwater discharges listed above in Part 1.2.2, commingled with a

discharge authorized by a different NPDES permit and/or a discharge that does not require NPDES permit authorization.

1.3 PROHIBITED DISCHARGES[6]

1.3.1 Wastewater from washout of concrete, unless managed by an appropriate control as described in Part 2.3.4;

1.3.2 Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials;

1.3.3 Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;

1.3.4 Soaps, solvents, or detergents used in vehicle and equipment washing or external building washdown; and

1.3.5 Toxic or hazardous substances from a spill or other release.

To prevent the above-listed prohibited non-stormwater discharges, operators must comply with the applicable pollution prevention requirements in Part 2.3.

1.4 SUBMITTING YOUR NOTICE OF INTENT (NOI)

All "operators" (as defined in Appendix A) associated with your construction site, who meet the Part 1.1 eligibility requirements, and who seek coverage under this permit, must submit to EPA a complete and accurate NOI in accordance with the deadlines in **Table 1** prior to commencing construction activities.

Exception: If you are conducting construction activities in response to a public emergency *(e.g., mud slides, earthquake, extreme flooding conditions, widespread disruption in essential public services)*, and the related work requires immediate authorization to avoid imminent endangerment to human health, public safety, or the environment, or to reestablish essential public services, you may discharge on the condition that a complete and accurate NOI is submitted within 30 calendar days after commencing construction activities (see Table 1) establishing that you are eligible for coverage under this permit. You must also provide documentation in your Stormwater Pollution Prevention Plan (SWPPP) to substantiate the occurrence of the public emergency.

1.4.1 Prerequisite for Submitting Your NOI

You must develop a SWPPP consistent with Part 7 before submitting your NOI for coverage under this permit.

1.4.2 How to Submit Your NOI

You must use EPA's NPDES eReporting Tool (NeT) to electronically prepare and submit your NOI for coverage under the 2017 CGP, unless you received a waiver from your EPA Regional Office.

To access NeT, go to https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting.

Waivers from electronic reporting may be granted based on one of the following conditions:

[6] EPA includes these prohibited non-stormwater discharges here as a reminder to the operator that the only non-stormwater discharges authorized by this permit are at Part 1.2.2. Any unauthorized non-stormwater discharges must be covered under an individual permit or alternative general permit.

a. If your operational headquarters is physically located in a geographic area (*i.e., ZIP code or census tract*) that is identified as under-served for broadband Internet access in the most recent report from the Federal Communications Commission; or

b. If you have limitations regarding available computer access or computer capability.

If the EPA Regional Office grants you approval to use a paper NOI, and you elect to use it, you must complete the form in Appendix J.

1.4.3 Deadlines for Submitting Your NOI and Your Official Date of Permit Coverage

Table 1 provides the deadlines for submitting your NOI and the official start date of your permit coverage, which differ depending on when you commence construction activities.

Table 1 NOI Submittal Deadlines and Official Start Date for Permit Coverage.

Type of Operator	NOI Submittal Deadline[7]	Permit Authorization Date[8]
Operator of a new site (*i.e., a site where construction activities commence on or after February 16, 2017*)	At least 14 calendar days before commencing construction activities.	14 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization is delayed or denied.
Operator of an existing site *(i.e., a site with 2012 CGP coverage where construction activities commenced prior to February 16, 2017*)	No later than **May 17, 2017**.	
New operator of a permitted site (*i.e., an operator that through transfer of ownership and/or operation replaces the operator of an already permitted construction site that is either a "new site" or an "existing site"*)	At least 14 calendar days before the date the transfer to the new operator will take place.	
Operator of an "emergency-related project" (*i.e., a project initiated in response to a public emergency (e.g., mud slides, earthquake, extreme flooding conditions, disruption in essential public services), for which the related work requires immediate authorization to avoid imminent endangerment to human health or the environment, or to reestablish essential public services*)	No later than 30 calendar days after commencing construction activities.	You are considered provisionally covered under the terms and conditions of this permit immediately, and fully covered 14 calendar days after EPA notifies you that it has received a complete NOI, unless EPA notifies you that your authorization is delayed or denied.

1.4.4 Modifying your NOI

[7] If you miss the deadline to submit your NOI, any and all discharges from your construction activities will continue to be unauthorized under the CWA until they are covered by this or a different NPDES permit. EPA may take enforcement action for any unpermitted discharges that occur between the commencement of construction activities and discharge authorization.

[8] Discharges are not authorized if your NOI is incomplete or inaccurate or if you are not eligible for permit coverage.

If after submitting your NOI you need to correct or update any fields, you may do so by submitting a "Change NOI" form using NeT. Waivers from electronic reporting may be granted as specified in Part 1.4.1. If the EPA Regional Office has granted you approval to submit a paper NOI modification, you may indicate any NOI changes on the same NOI form in Appendix J.

When there is a change to the site's operator, the new operator must submit a new NOI, and the previous operator must submit a Notice of Termination (NOT) form as specified in Part 8.3.

1.4.5 Your Official End Date of Permit Coverage

Once covered under this permit, your coverage will last until the date that:

a. You terminate permit coverage consistent with Part 8; or

b. You receive permit coverage under a different NPDES permit or a reissued or replacement version of this permit after expiring on February 16, 2022; or

c. You fail to submit an NOI for coverage under a revised or replacement version of this permit before the deadline for existing construction sites where construction activities continue after this permit has expired.

1.5 REQUIREMENT TO POST A NOTICE OF YOUR PERMIT COVERAGE

You must post a sign or other notice of your permit coverage at a safe, publicly accessible location in close proximity to the construction site. The notice must be located so that it is visible from the public road that is nearest to the active part of the construction site, and it must use a font large enough to be readily viewed from a public right-of-way.[9] At a minimum, the notice must include:

a. The NPDES ID (*i.e., permit tracking number assigned to your NOI*);

b. A contact name and phone number for obtaining additional construction site information;

c. The Uniform Resource Locator (URL) for the SWPPP (if available), or the following statement: "If you would like to obtain a copy of the Stormwater Pollution Prevention Plan (SWPPP) for this site, contact the EPA Regional Office at [*include the appropriate CGP Regional Office contact information found at https://www.epa.gov/npdes/contact-us-stormwater#regional*];" and

d. The following statement "If you observe indicators of stormwater pollutants in the discharge or in the receiving waterbody, contact the EPA through the following website: https://www.epa.gov/enforcement/report-environmental-violations."

2 TECHNOLOGY-BASED EFFLUENT LIMITATIONS

You must comply with the following technology-based effluent limitations in this Part for all authorized discharges.[10]

[9] If the active part of the construction site is not visible from a public road, then place the notice of permit coverage in a position that is visible from the nearest public road and as close as possible to the construction site.

[10] For each of the effluent limits in Part 2, as applicable to your site, you must include in your SWPPP (1) a description of the specific control(s) to be implemented to meet the effluent limit; (2) any applicable design specifications; (3) routine maintenance specifications; and (4) the projected schedule for its (their)

2.1 GENERAL STORMWATER CONTROL DESIGN, INSTALLATION, AND MAINTENANCE REQUIREMENTS

You must design, install, and maintain stormwater controls required in Parts 2.2 and 2.3 to minimize the discharge of pollutants in stormwater from construction activities. To meet this requirement, you must:

2.1.1 Account for the following factors in designing your stormwater controls:

a. The expected amount, frequency, intensity, and duration of precipitation;

b. The nature of stormwater runoff and run-on at the site, including factors such as expected flow from impervious surfaces, slopes, and site drainage features. You must design stormwater controls to control stormwater volume, velocity, and peak flow rates to minimize discharges of pollutants in stormwater and to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points; and

c. The soil type and range of soil particle sizes expected to be present on the site.

2.1.2 Design and install all stormwater controls in accordance with good engineering practices, including applicable design specifications.[11]

2.1.3 Complete installation of stormwater controls by the time each phase of construction activities has begun.

a. By the time construction activity in any given portion of the site begins, install and make operational any downgradient sediment controls (*e.g., buffers, perimeter controls, exit point controls, storm drain inlet protection*) that control discharges from the initial site clearing, grading, excavating, and other earth-disturbing activities.[12]

b. Following the installation of these initial controls, install and make operational all stormwater controls needed to control discharges prior to subsequent earth-disturbing activities.

2.1.4 Ensure that all stormwater controls are maintained and remain in effective operating condition during permit coverage and are protected from activities that would reduce their effectiveness.

a. Comply with any specific maintenance requirements for the stormwater controls listed in this permit, as well as any recommended by the manufacturer.[13]

b. If at any time you find that a stormwater control needs routine maintenance, you must immediately initiate the needed maintenance work, and complete such work by the close of the next business day.

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installation/implementation. See Part 7.2.6.

[11] Design specifications may be found in manufacturer specifications and/or in applicable erosion and sediment control manuals or ordinances. Any departures from such specifications must reflect good engineering practices and must be explained in your SWPPP. You must also comply with any additional design and installation requirements specified for the effluent limits in Parts 2.2 and 2.3.

[12] Note that the requirement to install stormwater controls prior to each phase of construction activities for the site does not apply to the earth disturbance associated with the actual installation of these controls. Operators should take all reasonable actions to minimize the discharges of pollutants during the installation of stormwater controls.

[13] Any departures from such maintenance recommendations made by the manufacturer must reflect good engineering practices and must be explained in your SWPPP.

c. If at any time you find that a stormwater control needs repair or replacement, you must comply with the corrective action requirements in Part 5.

2.2 EROSION AND SEDIMENT CONTROL REQUIREMENTS

You must implement erosion and sediment controls in accordance with the following requirements to minimize the discharge of pollutants in stormwater from construction activities.

2.2.1 Provide and maintain natural buffers and/or equivalent erosion and sediment controls when a water of the U.S. is located within 50 feet of the site's earth disturbances.

a. **Compliance Alternatives.** For any discharges to waters of the U.S. located within 50 feet of your site's earth disturbances, you must comply with one of the following alternatives:

   i. Provide and maintain a 50-foot undisturbed natural buffer; or

   ii. Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or

   iii. If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

   See Appendix G, Part G.2 for additional conditions applicable to each compliance alternative.

b. **Exceptions.** See Appendix G, Part G.2 for exceptions to the compliance alternatives.

2.2.2 Direct stormwater to vegetated areas and maximize stormwater infiltration and filtering to reduce pollutant discharges, unless infeasible.

2.2.3 Install sediment controls along any perimeter areas of the site that will receive pollutant discharges.[14]

a. Remove sediment before it has accumulated to one-half of the above-ground height of any perimeter control.

b. **Exception**. For areas at "linear construction sites" (as defined in Appendix A) where perimeter controls are infeasible *(e.g., due to a limited or restricted right-of-way),* implement other practices as necessary to minimize pollutant discharges to perimeter areas of the site.

2.2.4 Minimize sediment track-out.

a. Restrict vehicle use to properly designated exit points;

b. Use appropriate stabilization techniques[15] at all points that exit onto paved roads.

[14] Examples of perimeter controls include filter berms, silt fences, vegetative strips, and temporary diversion dikes.

[15] Examples of appropriate stabilization techniques include the use of aggregate stone with an underlying geotextile or non-woven filter fabric, and turf mats.

i. **Exception**: Stabilization is not required for exit points at linear utility construction sites that are used only episodically and for very short durations over the life of the project, provided other exit point controls[16] are implemented to minimize sediment track-out;

c. Implement additional track-out controls[17] as necessary to ensure that sediment removal occurs prior to vehicle exit; and

d. Where sediment has been tracked-out from your site onto paved roads, sidewalks, or other paved areas outside of your site, remove the deposited sediment by the end of the same business day in which the track-out occurs or by the end of the next business day if track-out occurs on a non-business day. Remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. You are prohibited from hosing or sweeping tracked-out sediment into any stormwater conveyance, storm drain inlet, or water of the U.S.[18]

2.2.5 Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil:

a. Locate the piles outside of any natural buffers established under Part 2.2.1 and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated;

b. Install a sediment barrier along all downgradient perimeter areas;[19]

c. For piles that will be unused for 14 or more days, provide cover[20] or appropriate temporary stabilization (consistent with Part 2.2.14);

d. You are prohibited from hosing down or sweeping soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the U.S.

2.2.6 Minimize dust. On areas of exposed soil, minimize dust through the appropriate application of water or other dust suppression techniques to control the generation of pollutants that could be discharged in stormwater from the site.

2.2.7 Minimize steep slope disturbances. Minimize the disturbance of "steep slopes" (as defined in Appendix A).

[16] Examples of other exit point controls include preventing the use of exit points during wet periods; minimizing exit point use by keeping vehicles on site to the extent possible; limiting exit point size to the width needed for vehicle and equipment usage; using scarifying and compaction techniques on the soil; and avoiding establishing exit points in environmentally sensitive areas *(e.g., karst areas; steep slopes)*.

[17] Examples of additional track-out controls include the use of wheel washing, rumble strips, and rattle plates.

[18] Fine grains that remain visible *(i.e., staining)* on the surfaces of off-site streets, other paved areas, and sidewalks after you have implemented sediment removal practices are not a violation of Part 2.2.4.

[19] Examples of sediment barriers include berms, dikes, fiber rolls, silt fences, sandbags, gravel bags, or straw bale.

[20] Examples of cover include tarps, blown straw and hydroseeding.

2.2.8 Preserve native topsoil, unless infeasible.[21]

2.2.9 Minimize soil compaction.[22] In areas of your site where final vegetative stabilization will occur or where infiltration practices will be installed:

a. Restrict vehicle and equipment use in these locations to avoid soil compaction; and

b. Before seeding or planting areas of exposed soil that have been compacted, use techniques that rehabilitate and condition the soils as necessary to support vegetative growth.

2.2.10 Protect storm drain inlets.

a. Install inlet protection measures that remove sediment from discharges prior to entry into any storm drain inlet that carries stormwater flow from your site to a water of the U.S., provided you have authority to access the storm drain inlet;[23] and

b. Clean, or remove and replace, the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible.

2.2.11 Control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points. [24].

2.2.12 If you install a sediment basin or similar impoundment:

a. Situate the basin or impoundment outside of any water of the U.S. and any natural buffers established under Part 2.2.1;

b. Design the basin or impoundment to avoid collecting water from wetlands;

c. Design the basin or impoundment to provide storage for either:

   i. The calculated volume of runoff from a 2-year, 24-hour storm (see Appendix H); or

   ii. 3,600 cubic feet per acre drained.

[21] Stockpiling topsoil at off-site locations, or transferring topsoil to other locations, is an example of a practice that is consistent with the requirements in Part 2.2.8. Preserving native topsoil is not required where the intended function of a specific area of the site dictates that the topsoil be disturbed or removed. For example, some sites may be designed to be highly impervious after construction, and therefore little or no vegetation is intended to remain, or may not have space to stockpile native topsoil on site for later use, in which case, it may not be feasible to preserve topsoil.

[22] Minimizing soil compaction is not required where the intended function of a specific area of the site dictates that it be compacted.

[23] Inlet protection measures can be removed in the event of flood conditions or to prevent erosion.

[24] Examples of control measures that can be used to comply with this requirement include the use of erosion controls and/or velocity dissipation devices (e.g., check dams, sediment traps), within and along the length of a stormwater conveyance and at the outfall to slow down runoff.

d. Utilize outlet structures that withdraw water from the surface of the sediment basin or similar impoundment, unless infeasible;[25]

e. Use erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets; and

f. Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition.

2.2.13 If using treatment chemicals (*e.g., polymers, flocculants, coagulants*):

a. **Use conventional erosion and sediment controls before and after the application of treatment chemicals.** Chemicals may only be applied where treated stormwater is directed to a sediment control *(e.g., sediment basin, perimeter control)* before discharge.

b. **Select appropriate treatment chemicals***.* Chemicals must be appropriately suited to the types of soils likely to be exposed during construction and present in the discharges being treated *(i.e., the expected turbidity, pH, and flow rate of stormwater flowing into the chemical treatment system or area)*.

c. **Minimize discharge risk from stored chemicals.** Store all treatment chemicals in leak-proof containers that are kept under storm-resistant cover and surrounded by secondary containment structures *(e.g., spill berms, decks, spill containment pallets),* or provide equivalent measures designed and maintained to minimize the potential discharge of treatment chemicals in stormwater or by any other means *(e.g., storing chemicals in a covered area, having a spill kit available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill)*.

d. **Comply with state/local requirements.** Comply with applicable state and local requirements regarding the use of treatment chemicals.

e. **Use chemicals in accordance with good engineering practices and specifications of the chemical provider/supplier.** Use treatment chemicals and chemical treatment systems in accordance with good engineering practices, and with dosing specifications and sediment removal design specifications provided by the provider/supplier of the applicable chemicals, or document in your SWPPP specific departures from these specifications and how they reflect good engineering practice.

f. **Ensure proper training.** Ensure that all persons who handle and use treatment chemicals at the construction site are provided with appropriate, product-specific training. Among other things, the training must cover proper dosing requirements.

g. **Perform additional measures specified by the EPA Regional Office for the authorized use of cationic chemicals.** If you have been authorized to use cationic chemicals at your site pursuant to Part 1.1.9, you must perform all additional measures as conditioned by your authorization to ensure that the use of such chemicals will not cause an exceedance of water quality standards.

[25] The circumstances in which it is infeasible to design outlet structures in this manner are rare. Exceptions may include areas with extended cold weather, where using surface outlets may not be feasible during certain time periods (although they must be used during other periods). If you determine that it is infeasible to meet this requirement, you must provide documentation in your SWPPP to support your determination, including the specific conditions or time periods when this exception will apply.

2.2.14 Stabilize exposed portions of the site. Implement and maintain stabilization measures (*e.g., seeding protected by erosion controls until vegetation is established, sodding, mulching, erosion control blankets, hydromulch, gravel*) that minimize erosion from exposed portions of the site in accordance with Parts 2.2.14a and 2.2.14b.

a. **Stabilization Deadlines:**[26]

Total Amount of Land Disturbance Occurring At Any One Time[27]	**Deadline**
i. **Five acres or less (≤5.0)** **Note: this includes sites disturbing more than five acres (>5.0) total over the course of a project, but that limit disturbance at any one time *(i.e., phase the disturbance)* to five acres or less (≤5.0)**	• Initiate the installation of stabilization measures immediately[28] in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days;[29] and • Complete the installation of stabilization measures as soon as practicable, but no later than 14 calendar days after stabilization has been initiated.[30]

[26] EPA may determine, based on an inspection carried out under Part 4.8 and corrective actions required under Part 5.3, that the level of sediment discharge on the site makes it necessary to require a faster schedule for completing stabilization. For instance, if sediment discharges from an area of exposed soil that is required to be stabilized are compromising the performance of existing stormwater controls, EPA may require stabilization to correct this problem.

[27] Limiting disturbances to five (5) acres or less at any one time means that at no time during the project do the cumulative earth disturbances exceed five (5) acres. The following examples would qualify as limiting disturbances at any one time to five (5) acres or less:

1. The total area of disturbance for a project is five (5) acres or less.
2. The total area of disturbance for a project will exceed five (5) acres, but the operator ensures that no more than five (5) acres will be disturbed at any one time through implementation of stabilization measures. In this way, site stabilization can be used to "free up" land that can be disturbed without exceeding the five (5)-acre cap to qualify for the 14-day stabilization deadline. For instance, if an operator completes stabilization of two (2) acres of land on a five (5)-acre disturbance, then two (2) additional acres could be disturbed while still qualifying for the longer 14-day stabilization deadline.

[28] The following are examples of activities that would constitute the immediate initiation of stabilization:

1. Prepping the soil for vegetative or non-vegetative stabilization as long as seeding, planting, and/or installation of non-vegetative stabilization products takes place as soon as practicable, but no later than one (1) calendar day of completing soil preparation;
2. Applying mulch or other non-vegetative product to the exposed area;
3. Seeding or planting the exposed area;
4. Starting any of the activities in # 1 – 3 on a portion of the entire area that will be stabilized; and
5. Finalizing arrangements to have stabilization product fully installed in compliance with the deadlines for completing stabilization.

[29] The requirement to initiate stabilization immediately is triggered as soon as you know that construction work on a portion of the site is temporarily ceased and will not resume for 14 or more days, or as soon as you know that construction work is permanently ceased. In the context of this provision, "immediately" means as soon as practicable, but no later than the end of the next business day, following the day when the construction activities have temporarily or permanently ceased.

[30] If vegetative stabilization measures are being implemented, stabilization is considered "installed" when all activities necessary to seed or plant the area are completed. If non-vegetative stabilization measures are being implemented, stabilization is considered "installed" when all such measures are implemented or applied.

ii. **More than five acres (>5.0)**	• Initiate the installation of stabilization measures immediately[31] in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 14 or more calendar days;[32] and • Complete the installation of stabilization measures as soon as practicable, but no later than seven (7) calendar days after stabilization has been initiated.[33]

iii. **Exceptions:**

(a) Arid, semi-arid, and drought-stricken areas (as defined in Appendix A)**.** If it is the seasonally dry period or a period in which drought is occurring, and vegetative stabilization measures are being used:

(i) Immediately initiate and, within 14 calendar days of a temporary or permanent cessation of work in any portion of your site, complete the installation of temporary non-vegetative stabilization measures to the extent necessary to prevent erosion;

(ii) As soon as practicable, given conditions or circumstances on the site, complete all activities necessary to seed or plant the area to be stabilized; and

(iii) If construction is occurring during the seasonally dry period, indicate in your SWPPP the beginning and ending dates of the seasonally dry period and your site conditions. Also include the schedule you will follow for initiating and completing vegetative stabilization.

(b) Operators that are affected by unforeseen circumstances[34] that delay the initiation and/or completion of vegetative stabilization:

(i) Immediately initiate and, within 14 calendar days, complete the installation of temporary non-vegetative stabilization measures to prevent erosion;

(ii) Complete all soil conditioning, seeding, watering or irrigation installation, mulching, and other required activities related to the planting and initial establishment of vegetation as soon as conditions or circumstances allow it on your site; and

(iii) Document in the SWPPP the circumstances that prevent you from meeting the deadlines in Part 2.2.14a and the schedule you will follow for initiating and completing stabilization.

(c) Discharges to a sediment- or nutrient-impaired water or to a water that is identified by your state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes. Complete stabilization as soon as

[31] See footnote 27

[32] See footnote 28

[33] See footnote 29

[34] Examples include problems with the supply of seed stock or with the availability of specialized equipment and unsuitability of soil conditions due to excessive precipitation and/or flooding.

practicable, but no later than seven (7) calendar days after stabilization has been initiated.

b. **Final Stabilization Criteria** (for any areas not covered by permanent structures)**:**

i. Establish uniform, perennial vegetation *(i.e., evenly distributed, without large bare areas)* that provides 70 percent or more of the cover that is provided by vegetation native to local undisturbed areas; and/or

ii. Implement permanent non-vegetative stabilization measures[35] to provide effective cover.

iii. **Exceptions:**

(a) Arid, semi-arid, and drought-stricken areas (as defined in Appendix A). Final stabilization is met if the area has been seeded or planted to establish vegetation that provides 70 percent or more of the cover that is provided by vegetation native to local undisturbed areas within three (3) years and, to the extent necessary to prevent erosion on the seeded or planted area, non-vegetative erosion controls have been applied that provide cover for at least three years without active maintenance.

(b) Disturbed areas on agricultural land that are restored to their preconstruction agricultural use. The Part 2.2.14b final stabilization criteria does not apply.

(c) **Areas that need to remain disturbed.** In limited circumstances, stabilization may not be required if the intended function of a specific area of the site necessitates that it remain disturbed, and only the minimum area needed remains disturbed *(e.g., dirt access roads, utility pole pads, areas being used for storage of vehicles, equipment, materials)*.

2.3 POLLUTION PREVENTION REQUIREMENTS[36]

You must implement pollution prevention controls in accordance with the following requirements to minimize the discharge of pollutants in stormwater and to prevent the discharge of pollutants from spilled or leaked materials from construction activities.

2.3.1 For equipment and vehicle fueling and maintenance:

a. Provide an effective means of eliminating the discharge of spilled or leaked chemicals, including fuels and oils, from these activities;[37]

[35] Examples of permanent non-vegetative stabilization measures include riprap, gravel, gabions, and geotextiles.

[36] Under this permit, you are not required to minimize exposure for any products or materials where the exposure to precipitation and to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

[37] Examples of effective means include:
- Locating activities away from waters of the U.S. and stormwater inlets or conveyances so that stormwater coming into contact with these activities cannot reach waters of the U.S.;
- Providing secondary containment (*e.g., spill berms, decks, spill containment pallets*) and cover where appropriate; and
- Having a spill kit available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill.

b. If applicable, comply with the Spill Prevention Control and Countermeasures (SPCC) requirements in 40 CFR part 112 and Section 311 of the CWA;

c. Ensure adequate supplies are available at all times to handle spills, leaks, and disposal of used liquids;

d. Use drip pans and absorbents under or around leaky vehicles;

e. Dispose of or recycle oil and oily wastes in accordance with other federal, state, tribal, or local requirements; and

f. Clean up spills or contaminated surfaces immediately, using dry clean up measures (do not clean contaminated surfaces by hosing the area down), and eliminate the source of the spill to prevent a discharge or a continuation of an ongoing discharge.

2.3.2 For equipment and vehicle washing:

a. Provide an effective means of minimizing the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of wash waters;[38]

b. Ensure there is no discharge of soaps, solvents, or detergents in equipment and vehicle wash water; and

c. For storage of soaps, detergents, or solvents, provide either (1) cover *(e.g., plastic sheeting, temporary roofs)* to minimize the exposure of these detergents to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas.

2.3.3 For storage, handling, and disposal of building products, materials, and wastes:

a. *For building materials and building products*[39], provide either (1) cover (*e.g., plastic sheeting, temporary roofs*) to minimize the exposure of these products to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas.

   Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk of stormwater contamination (such as final products and materials intended for outdoor use).

b. *For pesticides, herbicides, insecticides, fertilizers, and landscape materials*:

   i. In storage areas, provide either (1) cover (*e.g., plastic sheeting, temporary roofs*) to minimize the exposure of these chemicals to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas; and

   ii. Comply with all application and disposal requirements included on the registered pesticide, herbicide, insecticide, and fertilizer label (see also Part 2.3.5).

c. *For diesel fuel, oil, hydraulic fluids, other petroleum products, and other chemicals*:

[38] Examples of effective means include locating activities away from waters of the U.S. and stormwater inlets or conveyances and directing wash waters to a sediment basin or sediment trap, using filtration devices, such as filter bags or sand filters, or using other similarly effective controls.

[39] Examples of building materials and building products typically present at construction sites include asphalt sealants, copper flashing, roofing materials, adhesives, concrete admixtures, and gravel and mulch stockpiles.

i. Store chemicals in water-tight containers, and provide either (1) cover *(e.g., plastic sheeting, temporary roofs)* to minimize the exposure of these containers to precipitation and to stormwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas *(e.g., having a spill kit available on site and ensuring personnel are available to respond expeditiously in the event of a leak or spill)*, or provide secondary containment *(e.g., spill berms, decks, spill containment pallets)*; and

ii. Clean up spills immediately, using dry clean-up methods where possible, and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge.

d. *For hazardous or toxic wastes*:[40]

i. Separate hazardous or toxic waste from construction and domestic waste;

ii. Store waste in sealed containers, which are constructed of suitable materials to prevent leakage and corrosion, and which are labeled in accordance with applicable Resource Conservation and Recovery Act (RCRA) requirements and all other applicable federal, state, tribal, or local requirements;

iii. Store all outside containers within appropriately-sized secondary containment (*e.g., spill berms, decks, spill containment pallets*) to prevent spills from being discharged, or provide a similarly effective means designed to prevent the discharge of pollutants from these areas *(e.g., storing chemicals in a covered area, having a spill kit available on site);*

iv. Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended method of disposal and in compliance with federal, state, tribal, and local requirements;

v. Clean up spills immediately, using dry clean-up methods, and dispose of used materials properly. You are prohibited from hosing the area down to clean surfaces or spills. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge; and

vi. Follow all other federal, state, tribal, and local requirements regarding hazardous or toxic waste.

e. *For construction and domestic wastes*:[41]

i. Provide waste containers *(e.g., dumpster, trash receptacle)* of sufficient size and number to contain construction and domestic wastes;

ii. Keep waste container lids closed when not in use and close lids at the end of the business day for those containers that are actively used throughout the day. For waste containers that do not have lids, provide either (1) cover *(e.g., a tarp, plastic sheeting, temporary roof)* to minimize exposure of wastes to precipitation,

[40] Examples of hazardous or toxic waste that may be present at construction sites include paints, caulks, sealants, fluorescent light ballasts, solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids.

[41] Examples of construction and domestic waste include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, demolition debris; and other trash or building materials.

or (2) a similarly effective means designed to minimize the discharge of pollutants *(e.g., secondary containment)*;

iii. On business days, clean up and dispose of waste in designated waste containers; and

iv. Clean up immediately if containers overflow.

f. *For sanitary waste*, position portable toilets so that they are secure and will not be tipped or knocked over, and located away from waters of the U.S. and stormwater inlets or conveyances.

2.3.4 For washing applicators and containers used for stucco, paint, concrete, form release oils, curing compounds, or other materials:

a. Direct wash water into a leak-proof container or leak-proof and lined pit designed so that no overflows can occur due to inadequate sizing or precipitation;

b. Handle washout or cleanout wastes as follows:

i. Do not dump liquid wastes in storm sewers or waters of the U.S.;

ii. Dispose of liquid wastes in accordance with applicable requirements in Part 2.3.3; and

iii. Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes in Part 2.3.3; and

c. Locate any washout or cleanout activities as far away as possible from waters of the U.S. and stormwater inlets or conveyances, and, to the extent feasible, designate areas to be used for these activities and conduct such activities only in these areas.

2.3.5 For the application of fertilizers:

a. Apply at a rate and in amounts consistent with manufacturer's specifications, or document in the SWPPP departures from the manufacturer specifications where appropriate in accordance with Part 7.2.6.b.ix;

b. Apply at the appropriate time of year for your location, and preferably timed to coincide as closely as possible to the period of maximum vegetation uptake and growth;

c. Avoid applying before heavy rains that could cause excess nutrients to be discharged;

d. Never apply to frozen ground;

e. Never apply to stormwater conveyance channels; and

f. Follow all other federal, state, tribal, and local requirements regarding fertilizer application.

2.3.6 Emergency Spill Notification Requirements

Discharges of toxic or hazardous substances from a spill or other release are prohibited, consistent with Part 1.3.5. Where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR 110, 40 CFR 117, or 40 CFR 302 occurs during a 24-hour period, you must notify the National Response Center (NRC) at (800) 424-8802 or, in the Washington, DC metropolitan area, call (202) 267-2675 in accordance with the requirements of 40 CFR 110, 40 CFR 117, and 40 CFR 302 as soon as you have knowledge of the release. You must also, within seven (7) calendar days of knowledge of the release, provide a

description of the release, the circumstances leading to the release, and the date of the release. State, tribal, or local requirements may necessitate additional reporting of spills or discharges to local emergency response, public health, or drinking water supply agencies.

2.4 CONSTRUCTION DEWATERING REQUIREMENTS

Comply with the following requirements to minimize the discharge of pollutants in ground water or accumulated stormwater that is removed from excavations, trenches, foundations, vaults, or other similar points of accumulation, in accordance with Part 1.2.2.[42]

2.4.1 Treat dewatering discharges with controls to minimize discharges of pollutants;[43]

2.4.2 Do not discharge visible floating solids or foam;

2.4.3 Use an oil-water separator or suitable filtration device (such as a cartridge filter) that is designed to remove oil, grease, or other products if dewatering water is found to contain these materials;

2.4.4 To the extent feasible, use vegetated, upland areas of the site to infiltrate dewatering water before discharge. You are prohibited from using waters of the U.S. as part of the treatment area;

2.4.5 At all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 2.2.11;

2.4.6 With backwash water, either haul it away for disposal or return it to the beginning of the treatment process; and

2.4.7 Replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.

3 WATER QUALITY-BASED EFFLUENT LIMITATIONS

3.1 GENERAL EFFLUENT LIMITATION TO MEET APPLICABLE WATER QUALITY STANDARDS

Discharges must be controlled as necessary to meet applicable water quality standards. Discharges must also comply with any additional state or tribal requirements that are in Part 9.

In the absence of information demonstrating otherwise, EPA expects that compliance with the conditions in this permit will result in stormwater discharges being controlled as necessary to meet applicable water quality standards. If at any time you become aware, or EPA determines, that discharges are not being controlled as necessary to meet applicable water quality standards, you must take corrective action as required in Parts 5.1 and 5.2, and document the corrective actions as required in Part 5.4.

[42] Uncontaminated, clear (non-turbid) dewatering water can be discharged without being routed to a control.

[43] Appropriate controls include sediment basins or sediment traps, sediment socks, dewatering tanks, tube settlers, weir tanks, filtration systems (*e.g., bag or sand filters*), and passive treatment systems that are designed to remove sediment. Appropriate controls to use downstream of dewatering controls to minimize erosion include vegetated buffers, check dams, riprap, and grouted riprap at outlets.

EPA may insist that you install additional controls (to meet the narrative water quality-based effluent limit above) on a site-specific basis, or require you to obtain coverage under an individual permit, if information in your NOI or from other sources indicates that your discharges are not controlled as necessary to meet applicable water quality standards. This includes situations where additional controls are necessary to comply with a wasteload allocation in an EPA-established or approved TMDL.

If during your coverage under a previous permit, you were required to install and maintain stormwater controls specifically to meet the assumptions and requirements of an EPA-approved or established TMDL (for any parameter) or to otherwise control your discharge to meet water quality standards, you must continue to implement such controls as part of your coverage under this permit.

3.2 DISCHARGE LIMITATIONS FOR SITES DISCHARGING TO SENSITIVE WATERS[44]

For any portion of the site that discharges to a sediment or nutrient-impaired water or to a water that is identified by your state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes, you must comply with the inspection frequency specified in 4.3 and you must comply with the stabilization deadline specified in Part 2.2.14.a.iii.(c).[45]

If you discharge to a water that is impaired for a parameter other than a sediment-related parameter or nutrients, EPA will inform you if any additional controls are necessary for your discharge to be controlled as necessary to meet water quality standards, including for it to be consistent with the assumptions of any available wasteload allocation in any applicable TMDL, or if coverage under an individual permit is necessary.

In addition, on a case-by-case basis, EPA may notify operators of new sites or operators of existing sites with increased discharges that additional analyses, stormwater controls, or other measures are necessary to comply with the applicable

[44] Sensitive waters include waters that are impaired and Tier 2, Tier 2.5, and Tier 3 waters.

"Impaired waters" are those waters identified by the state, tribe, or EPA as not meeting an applicable water quality standard and (1) requires development of a TMDL (pursuant to section 303(d) of the CWA; or (2) is addressed by an EPA-approved or established TMDL; or (3) is not in either of the above categories but the waterbody is covered by a pollution control program that meets the requirements of 40 CFR 130.7(b)(1). Your construction site will be considered to discharge to an impaired water if the first water of the U.S. to which you discharge is an impaired water for the pollutants contained in the discharge from your site. For discharges that enter a storm sewer system prior to discharge, the first water of the U.S. to which you discharge is the waterbody that receives the stormwater discharge from the storm sewer system. For assistance in determining whether your site discharges to impaired waters, EPA has developed a tool that is available both within the electronic NOI form in NeT, and at https://water.epa.gov/polwaste/npdes/stormwater/discharge.cfm.

Tiers 2, 2.5 and 3 refer to waters either identified by the state as high quality waters or Outstanding National Resource Waters under 40 CFR 131.12(a)(2) and (3). For the purposes of this permit, you are considered to discharge to a Tier 2, Tier 2.5, or Tier 3 water if the first water of the U.S. to which you discharge is identified by a state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3. For discharges that enter a storm sewer system prior to discharge, the water of the U.S. to which you discharge is the first water of the U.S. that receives the stormwater discharge from the storm sewer system. See list of Tier 2, Tier 2.5, and Tier 3 waters in Appendix F.

EPA may determine on a case-by-case basis that a site discharges to a sensitive water.

[45] If you qualify for any of the reduced inspection frequencies in Part 4.4, you may conduct inspections in accordance with Part 4.4 for any portion of your site that discharges to a sensitive water.

antidegradation requirements, or notify you that an individual permit application is necessary.

If you discharge to a water that is impaired for polychlorinated biphenyls (PCBs) and are engaging in demolition of any structure with at least 10,000 square feet of floor space built or renovated before January 1, 1980, you must:

a. Implement controls[46] to minimize the exposure of PCB-containing building materials, including paint, caulk, and pre-1980 fluorescent lighting fixtures, to precipitation and to stormwater; and

b. Ensure that disposal of such materials is performed in compliance with applicable state, federal, and local laws.

4 SITE INSPECTION REQUIREMENTS

4.1 PERSON(S) RESPONSIBLE FOR INSPECTING SITE

The person(s) inspecting your site may be a person on your staff or a third party you hire to conduct such inspections. You are responsible for ensuring that the person who conducts inspections is a "qualified person."[47]

4.2 FREQUENCY OF INSPECTIONS.[48]

At a minimum, you must conduct a site inspection in accordance with one of the two schedules listed below, unless you are subject to the Part 4.3 site inspection frequency for discharges to sensitive waters or qualify for a Part 4.4 reduction in the inspection frequency:

4.2.1 At least once every seven (7) calendar days; *or*

4.2.2 Once every 14 calendar days *and* within 24 hours of the occurrence of a storm event of 0.25 inches or greater, or the occurrence of runoff from snowmelt sufficient to cause a discharge.[49] To determine if a storm event of 0.25 inches or greater has occurred on your site, you must either keep a properly maintained rain gauge on your site, or obtain the storm event information from a weather station that is representative of your location. For any day of rainfall during normal business hours that measures 0.25 inches or greater, you must record the total rainfall measured for that day in accordance with Part 4.7.1d.

[46] Examples of controls to minimize exposure of PCBs to precipitation and stormwater include separating work areas from non-work areas and selecting appropriate personal protective equipment and tools, constructing a containment area so that all dust or debris generated by the work remains within the protected area, using tools that minimize dust and heat (<212°F). For additional information, refer to Part 2.3.3 of the CGP Fact Sheet.

[47] A "qualified person" is a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

[48] Inspections are only required during the site's normal working hours.

[49] "Within 24 hours of the occurrence of a storm event" means that you must conduct an inspection within 24 hours once a storm event has produced 0.25 inches within a 24-hour period, even if the storm event is still continuing. Thus, if you have elected to inspect bi-weekly in accordance with Part 4.2.2 and there is a storm event at your site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, you must conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the end of the storm.

4.3 INCREASE IN INSPECTION FREQUENCY FOR SITES DISCHARGING TO SENSITIVE WATERS.

For any portion of the site that discharges to a sediment or nutrient-impaired water or to a water that is identified by your state, tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes (see Part 3.2), instead of the inspection frequency specified in Part 4.2, you must conduct inspections in accordance with the following inspection frequencies:

Once every seven (7) calendar days *and* within 24 hours of the occurrence of a storm event of 0.25 inches or greater, or the occurrence of runoff from snowmelt sufficient to cause a discharge. To determine if a storm event of 0.25 inches or greater has occurred on your site, you must either keep a properly maintained rain gauge on your site, or obtain the storm event information from a weather station that is representative of your location. For any day of rainfall during normal business hours that measures 0.25 inches or greater, you must record the total rainfall measured for that day in accordance with Part 4.7.1d.

4.4 REDUCTIONS IN INSPECTION FREQUENCY

4.4.1 Stabilized areas.

a. You may reduce the frequency of inspections to twice per month for the first month, no more than 14 calendar days apart, then once per month in any area of your site where the stabilization steps in 2.2.14a have been completed. If construction activity resumes in this portion of the site at a later date, the inspection frequency immediately increases to that required in Parts 4.2 and 4.3, as applicable. You must document the beginning and ending dates of this period in your SWPPP.

b. **Exception.** For "linear construction sites" (as defined in Appendix A) where disturbed portions have undergone final stabilization at the same time active construction continues on others, you may reduce the frequency of inspections to twice per month for the first month, no more than 14 calendar days apart, in any area of your site where the stabilization steps in 2.2.14a have been completed. After the first month, inspect once more within 24 hours of the occurrence of a storm event of 0.25 inches or greater. If there are no issues or evidence of stabilization problems, you may suspend further inspections. If "wash-out" of stabilization materials and/or sediment is observed, following re-stabilization, inspections must resume at the inspection frequency required in Part 4.4.1a Inspections must continue until final stabilization is visually confirmed following a storm event of 0.25 inches or greater.

4.4.2 Arid, semi-arid, or drought-stricken areas (as defined in Appendix A). If it is the seasonally dry period or a period in which drought is occurring, you may reduce the frequency of inspections to once per month and within 24 hours of the occurrence of a storm event of 0.25 inches or greater. You must document that you are using this reduced schedule and the beginning and ending dates of the seasonally dry period in your SWPPP. To determine if a storm event of 0.25 inches or greater has occurred on your site, you must either keep a properly maintained rain gauge on your site, or obtain the storm event information from a weather station that is representative of your location. For any day of rainfall during normal business hours that measures 0.25 inches or greater, you must record the total rainfall measured for that day in accordance with Part 4.7.1d.

4.4.3 Frozen conditions:

a. If you are suspending construction activities due to frozen conditions, you may temporarily suspend inspections on your site until thawing conditions (as defined in Appendix A) begin to occur if:

i. Runoff is unlikely due to continuous frozen conditions that are likely to continue at your site for at least three (3) months based on historic seasonal averages. If unexpected weather conditions (such as above freezing temperatures or rain events) make discharges likely, you must immediately resume your regular inspection frequency as described in Parts 4.2 and 4.3, as applicable;

ii. Land disturbances have been suspended; and

iii. All disturbed areas of the site have been stabilized in accordance with Part 2.2.14a.

b. If you are still conducting construction activities during frozen conditions, you may reduce your inspection frequency to once per month if:

i. Runoff is unlikely due to continuous frozen conditions that are likely to continue at your site for at least three (3) months based on historic seasonal averages. If unexpected weather conditions (such as above freezing temperatures or rain events) make discharges likely, you must immediately resume your regular inspection frequency as described in Parts 4.2 and 4.3, as applicable; and

ii. Except for areas in which you are actively conducting construction activities, disturbed areas of the site have been stabilized in accordance with Part 2.2.14a.

You must document the beginning and ending dates of this period in your SWPPP.

4.5 AREAS THAT MUST BE INSPECTED

During your site inspection, you must at a minimum inspect the following areas of your site:

4.5.1 All areas that have been cleared, graded, or excavated and that have not yet completed stabilization consistent with Part 2.2.14a;

4.5.2 All stormwater controls (including pollution prevention controls) installed at the site to comply with this permit;[50]

4.5.3 Material, waste, borrow, and equipment storage and maintenance areas that are covered by this permit;

4.5.4 All areas where stormwater typically flows within the site, including drainageways designed to divert, convey, and/or treat stormwater;

4.5.5 All points of discharge from the site; and

4.5.6 All locations where stabilization measures have been implemented.

You are not required to inspect areas that, at the time of the inspection, are considered unsafe to your inspection personnel.

4.6 REQUIREMENTS FOR INSPECTIONS

During your site inspection, you must at a minimum:

4.6.1 Check whether all stormwater controls *(i.e., erosion and sediment controls and pollution prevention controls)* are properly installed, appear to be operational, and are working as intended to minimize pollutant discharges;

[50] This includes the requirement to inspect for sediment that has been tracked out from the site onto paved roads, sidewalks, or other paved areas consistent with Part 2.2.4.

4.6.2 Check for the presence of conditions that could lead to spills, leaks, or other accumulations of pollutants on the site;

4.6.3 Identify any locations where new or modified stormwater controls are necessary to meet the requirements of Parts 2 and/or 3;

4.6.4 Check for signs of visible erosion and sedimentation *(i.e., sediment deposits)* that have occurred and are attributable to your discharge at points of discharge and, if applicable, the banks of any waters of the U.S. flowing within or immediately adjacent to the site;

4.6.5 Identify any incidents of noncompliance observed;

4.6.6 If a discharge is occurring during your inspection:

a. Identify all discharge points at the site; and

b. Observe and document the visual quality of the discharge, and take note of the characteristics of the stormwater discharge, including color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.

4.6.7 Based on the results of your inspection, complete any necessary maintenance under Part 2.1.4 and corrective action under Part 5.

4.7 INSPECTION REPORT

4.7.1 You must complete an inspection report within 24 hours of completing any site inspection. Each inspection report must include the following:

a. The inspection date;

b. Names and titles of personnel making the inspection;

c. A summary of your inspection findings, covering at a minimum the observations you made in accordance with Part 4.6, including any necessary maintenance or corrective actions;

d. If you are inspecting your site at the frequency specified in Part 4.2.2, Part 4.3, or Part 4.4.1b, and you conducted an inspection because of rainfall measuring 0.25 inches or greater, you must include the applicable rain gauge or weather station readings that triggered the inspection; and

e. If you determined that it is unsafe to inspect a portion of your site, you must describe the reason you found it to be unsafe and specify the locations to which this condition applies.

4.7.2 Each inspection report must be signed in accordance with Appendix I, Part I.11 of this permit.

4.7.3 You must keep a copy of all inspection reports at the site or at an easily accessible location, so that it can be made available at the time of an on-site inspection or upon request by EPA.

4.7.4 You must retain all inspection reports completed for this Part for at least three (3) years from the date that your permit coverage expires or is terminated.

4.8 INSPECTIONS BY EPA

You must allow EPA, or an authorized representative of EPA, to conduct the following activities at reasonable times. To the extent that you are utilizing shared controls that are

not on site to comply with this permit, you must make arrangements for EPA to have access at all reasonable times to those areas where the shared controls are located.

4.8.1 Enter onto all areas of the site, including any construction support activity areas covered by this permit, any off-site areas where shared controls are utilized to comply with this permit, discharge locations, adjoining waterbodies, and locations where records are kept under the conditions of this permit;

4.8.2 Access and copy any records that must be kept under the conditions of this permit;

4.8.3 Inspect your construction site, including any construction support activity areas covered by this permit (see Part 1.2.1c), any stormwater controls installed and maintained at the site, and any off-site shared controls utilized to comply with this permit; and

4.8.4 Sample or monitor for the purpose of ensuring compliance.

5 CORRECTIVE ACTIONS

5.1 CONDITIONS TRIGGERING CORRECTIVE ACTION.

You must take corrective action to address any of the following conditions identified at your site:

5.1.1 A stormwater control needs repair or replacement (beyond routine maintenance required under Part 2.1.4); or

5.1.2 A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly; or

5.1.3 Your discharges are causing an exceedance of applicable water quality standards; or

5.1.4 A prohibited discharge has occurred (see Part 1.3).

5.2 CORRECTIVE ACTION DEADLINES

For any corrective action triggering conditions in Part 5.1, you must**:**

5.2.1 Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events;

5.2.2 When the problem does not require a new or replacement control or significant repair, the corrective action must be completed by the close of the next business day;

5.2.3 When the problem requires a new or replacement control or significant repair, install the new or modified control and make it operational, or complete the repair, by no later than seven (7) calendar days from the time of discovery. If it is infeasible to complete the installation or repair within seven (7) calendar days, you must document in your records why it is infeasible to complete the installation or repair within the 7-day timeframe and document your schedule for installing the stormwater control(s) and making it operational as soon as feasible after the 7-day timeframe. Where these actions result in changes to any of the stormwater controls or procedures documented in your SWPPP, you must modify your SWPPP accordingly within seven (7) calendar days of completing this work.

5.3 CORRECTIVE ACTION REQUIRED BY EPA

You must comply with any corrective actions required by EPA as a result of permit violations found during an inspection carried out under Part 4.8.

5.4 CORRECTIVE ACTION REPORT

For each corrective action taken in accordance with this Part, you must complete a report in accordance with the following:

5.4.1 Within 24 hours of identifying the corrective action condition, document the specific condition and the date and time it was identified.

5.4.2 Within 24 hours of completing the corrective action (in accordance with the deadlines in Part 5.2), document the actions taken to address the condition, including whether any SWPPP modifications are required.

5.4.3 Each corrective action report must be signed in accordance with Appendix I, Part I.11 of this permit.

5.4.4 You must keep a copy of all corrective action reports at the site or at an easily accessible location, so that it can be made available at the time of an on-site inspection or upon request by EPA.

5.4.5 You must retain all corrective action reports completed for this Part for at least three (3) years from the date that your permit coverage expires or is terminated.

6 STAFF TRAINING REQUIREMENTS

Each operator, or group of multiple operators, must assemble a "stormwater team" to carry out compliance activities associated with the requirements in this permit.

6.1 Prior to the commencement of construction activities, you must ensure that the following personnel[51] on the stormwater team understand the requirements of this permit and their specific responsibilities with respect to those requirements:

a. Personnel who are responsible for the design, installation, maintenance, and/or repair of stormwater controls (including pollution prevention controls);
b. Personnel responsible for the application and storage of treatment chemicals (if applicable);
c. Personnel who are responsible for conducting inspections as required in Part 4.1; and
d. Personnel who are responsible for taking corrective actions as required in Part 5.

6.2 You are responsible for ensuring that all activities on the site comply with the requirements of this permit. You are not required to provide or document formal training for subcontractors or other outside service providers, but you must ensure that such personnel understand any requirements of this permit that may be affected by the work they are subcontracted to perform.

[51] If the person requiring training is a new employee who starts after you commence construction activities, you must ensure that this person has the proper understanding as required above prior to assuming particular responsibilities related to compliance with this permit.

For emergency-related projects, the requirement to train personnel prior to commencement of construction activities does not apply, however, such personnel must have the required training prior to NOI submission.

6.3 At a minimum, members of the stormwater team must be trained to understand the following if related to the scope of their job duties *(e.g., only personnel responsible for conducting inspections need to understand how to conduct inspections*):

a. The permit deadlines associated with installation, maintenance, and removal of stormwater controls and with stabilization;
b. The location of all stormwater controls on the site required by this permit and how they are to be maintained;
c. The proper procedures to follow with respect to the permit's pollution prevention requirements; and
d. When and how to conduct inspections, record applicable findings, and take corrective actions.

6.4 Each member of the stormwater team must have easy access to an electronic or paper copy of applicable portions of this permit, the most updated copy of your SWPPP, and other relevant documents or information that must be kept with the SWPPP.

7 STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

7.1 GENERAL REQUIREMENTS

All operators associated with a construction site under this permit must develop a SWPPP consistent with the requirements in Part 7 prior to their submittal of the NOI.[52, 53] The SWPPP must be kept up-to-date throughout coverage under this permit.

If a SWPPP was prepared under a previous version of this permit, the operator must review and update the SWPPP to ensure that this permit's requirements are addressed prior to submitting an NOI for coverage under this permit.

7.2 SWPPP CONTENTS

At a minimum, the SWPPP must include the information specified in this Part and as specified in other parts of this permit.

7.2.1 All Site Operators. Include a list of all other operators who will be engaged in construction activities at the site, and the areas of the site over which each operator has control.

7.2.2 Stormwater Team. Identify the personnel (by name or position) that are part of the stormwater team, as well as their individual responsibilities, including which members are responsible for conducting inspections.

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[52] The SWPPP does not establish the effluent limits and other permit terms and conditions that apply to your site's discharges; these limits, terms, and conditions are established in this permit.

Where there are multiple operators associated with the same site, they may develop a group SWPPP instead of multiple individual SWPPPs. Regardless of whether there is a group SWPPP or multiple individual SWPPPs, each operator is responsible for compliance with the permit's terms and conditions. In other words, if Operator A relies on Operator B to satisfy its permit obligations, Operator A does not have to duplicate those permit-related functions if Operator B is implementing them for both operators to be in compliance with the permit. However, Operator A remains responsible for permit compliance if Operator B fails to implement any measures necessary for Operator A to comply with the permit. In addition, all operators must ensure, either directly or through coordination with other operators, that their activities do not compromise any other operators' controls and/or any shared controls.

7.2.3 Nature of Construction Activities.[54] Include the following:

a. A description of the nature of your construction activities, including the age or dates of past renovations for structures that are undergoing demolition;

b. The size of the property (in acres or length in miles if a linear construction site);

c. The total area expected to be disturbed by the construction activities (to the nearest quarter acre or nearest quarter mile if a linear construction site);

d. A description of any on-site and off-site construction support activity areas covered by this permit (see Part 1.2.1c);

e. The maximum area expected to be disturbed at any one time, including on-site and off-site construction support activity areas;

f. A description and projected schedule for the following:

   i. Commencement of construction activities in each portion of the site, including clearing and grubbing, mass grading, demolition activities, site preparation (*i.e., excavating, cutting and filling*), final grading, and creation of soil and vegetation stockpiles requiring stabilization;

   ii. Temporary or permanent cessation of construction activities in each portion of the site;

   iii. Temporary or final stabilization of exposed areas for each portion of the site; and

   iv. Removal of temporary stormwater controls and construction equipment or vehicles, and the cessation of construction-related pollutant-generating activities.

g. A list and description of all pollutant-generating activities[55] on the site. For each pollutant-generating activity, include an inventory of pollutants or pollutant constituents (*e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels*) associated with that activity, which could be discharged in stormwater from your construction site. You must take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed or removed during construction;

h. Business days and hours for the project;

i. If you are conducting construction activities in response to a public emergency (see Part 1.4), a description of the cause of the public emergency *(e.g., mud slides, earthquake, extreme flooding conditions, widespread disruption in essential public services)*, information substantiating its occurrence *(e.g., state disaster declaration or similar state or local declaration)*, and a description of the construction necessary to reestablish affected public services.

7.2.4 Site Map. Include a legible map, or series of maps, showing the following features of the site:

a. Boundaries of the property;

[54] If plans change due to unforeseen circumstances or for other reasons, the requirement to describe the sequence and estimated dates of construction activities is not meant to "lock in" the operator to meeting these dates. When departures from initial projections are necessary, this should be documented in the SWPPP itself, or in associated records, as appropriate.

[55] Examples of pollutant-generating activities include paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations.

b. Locations where construction activities will occur, including:
   i. Locations where earth-disturbing activities will occur (note any phasing), including any demolition activities;
   ii. Approximate slopes before and after major grading activities (note any steep slopes (as defined in Appendix A));
   iii. Locations where sediment, soil, or other construction materials will be stockpiled;
   iv. Any water of the U.S. crossings;
   v. Designated points where vehicles will exit onto paved roads;
   vi. Locations of structures and other impervious surfaces upon completion of construction; and
   vii. Locations of on-site and off-site construction support activity areas covered by this permit (see Part 1.2.1c).
c. Locations of all waters of the U.S. within and one mile downstream of the site's discharge point. Also identify if any are listed as impaired, or are identified as a Tier 2, Tier 2.5, or Tier 3 water;
d. Areas of federally listed critical habitat within the site and/or at discharge locations;
e. Type and extent of pre-construction cover on the site (*e.g., vegetative cover, forest, pasture, pavement, structure*s);
f. Drainage patterns of stormwater and authorized non-stormwater before and after major grading activities;
g. Stormwater and authorized non-stormwater discharge locations, including:
   i. Locations where stormwater and/or authorized non-stormwater will be discharged to storm drain inlets;[56] and
   ii. Locations where stormwater or authorized non-stormwater will be discharged directly to waters of the U.S.
h. Locations of all potential pollutant-generating activities identified in Part 7.2.3g;
i. Locations of stormwater controls, including natural buffer areas and any shared controls utilized to comply with this permit; and
j. Locations where polymers, flocculants, or other treatment chemicals will be used and stored.

7.2.5 Non-Stormwater Discharges. Identify all authorized non-stormwater discharges in Part 1.2.2 that will or may occur.

7.2.6 Description of Stormwater Controls.

a. For each of the Part 2.2 erosion and sediment control effluent limits, Part 2.3 pollution prevention effluent limits, and Part 2.4 construction dewatering effluent limits, as applicable to your site, you must include the following:
   i. A description of the specific control(s) to be implemented to meet the effluent limit;

[56] The requirement to show storm drain inlets in the immediate vicinity of the site on your site map only applies to those inlets that are easily identifiable from your site or from a publicly accessible area immediately adjacent to your site.

ii. Any applicable stormwater control design specifications (including references to any manufacturer specifications and/or erosion and sediment control manuals/ordinances relied upon);[57]

iii. Routine stormwater control maintenance specifications; and

iv. The projected schedule for stormwater control installation/implementation.

b. You must also include any of the following additional information as applicable.

i. **Natural buffers and/or equivalent sediment controls** (see Part 2.2.1 and Appendix G). You must include the following:

(a) The compliance alternative to be implemented;

(b) If complying with alternative 2, the width of natural buffer retained;

(c) If complying with alternative 2 or 3, the erosion and sediment control(s) you will use to achieve an equivalent sediment reduction, and any information you relied upon to demonstrate the equivalency;

(d) If complying with alternative 3, a description of why it is infeasible for you to provide and maintain an undisturbed natural buffer of any size;

(e) For "linear construction sites" where it is infeasible to implement compliance alternative 1, 2, or 3, a rationale for this determination, and a description of any buffer width retained and/or supplemental erosion and sediment controls installed; and

(f) A description of any disturbances that are exempt under Part 2.2.1 that occur within 50 feet of a water of the U.S.

ii. **Perimeter controls for a "linear construction site"** (see Part 2.2.3). For areas where perimeter controls are not feasible, include documentation to support this determination and a description of the other practices that will be implemented to minimize discharges of pollutants in stormwater associated with construction activities.

Note: Routine maintenance specifications for perimeter controls documented in the SWPPP must include the Part 2.2.3a requirement that sediment be removed before it has accumulated to one-half of the above-ground height of any perimeter control.

iii. **Sediment track-out controls** (see Parts 2.2.4b and 2.2.4c). Document the specific stabilization techniques and/or controls that will be implemented to remove sediment prior to vehicle exit.

iv. **Sediment basins** (see Part 2.2.12). In circumstances where it is infeasible to utilize outlet structures that withdraw water from the surface, include documentation to support this determination, including the specific conditions or time periods when this exception will apply.

v. **Treatment chemicals** (see Part 2.2.13), you must include the following:

(a) A listing of the soil types that are expected to be exposed during construction in areas of the project that will drain to chemical treatment systems. Also include a listing of soil types expected to be found in fill material to be used in these same areas, to the extent you have this information prior to construction;

[57] Design specifications may be found in manufacturer specifications and/or in applicable erosion and sediment control manuals or ordinances. Any departures from such specifications must reflect good engineering practice and must be explained in the SWPPP.

(b) A listing of all treatment chemicals to be used at the site and why the selection of these chemicals is suited to the soil characteristics of your site;

(c) If the applicable EPA Regional Office authorized you to use cationic treatment chemicals for sediment control, include the specific controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to an exceedance of water quality standards;

(d) The dosage of all treatment chemicals to be used at the site or the methodology to be used to determine dosage;

(e) Information from any applicable Safety Data Sheet (SDS);

(f) Schematic drawings of any chemically enhanced stormwater controls or chemical treatment systems to be used for application of the treatment chemicals;

(g) A description of how chemicals will be stored consistent with Part 2.2.13c;

(h) References to applicable state or local requirements affecting the use of treatment chemicals, and copies of applicable manufacturer's specifications regarding the use of your specific treatment chemicals and/or chemical treatment systems; and

(i) A description of the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to use of the treatment chemicals at your site.

vi. **Stabilization measures** (see Part 2.2.14). You must include the following:

(a) The specific vegetative and/or non-vegetative practices that will be used;

(b) The stabilization deadline that will be met in accordance with Part 2.2.14.a.i-ii;

(c) If complying with the deadlines for sites in arid, semi-arid, or drought-stricken areas, the beginning and ending dates of the seasonally dry period and the schedule you will follow for initiating and completing vegetative stabilization; and

(d) If complying with deadlines for sites affected by unforeseen circumstances that delay the initiation and/or completion of vegetative stabilization, document the circumstances and the schedule for initiating and completing stabilization.

vii. **Spill prevention and response procedures** (see Part 1.3.5 and Part 2.3). You must include the following:

(a) Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or position of the employee(s) responsible for detection and response of spills or leaks; and

(b) Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.6 and established under either 40 CFR 110, 40 CFR 117, or 40 CFR 302, occurs during a 24-hour period. Contact information must be in locations that are readily accessible and available to all employees.

You may also reference the existence of Spill Prevention Control and

Countermeasure (SPCC) plans developed for the construction activity under Part 311 of the CWA, or spill control programs otherwise required by an NPDES permit for the construction activity, provided that you keep a copy of that other plan on site.[58]

viii. **Waste management procedures** (see Part 2.3.3). Describe the procedures you will follow for handling, storing and disposing of all wastes generated at your site consistent with all applicable federal, state, tribal, and local requirements, including clearing and demolition debris, sediment removed from the site, construction and domestic waste, hazardous or toxic waste, and sanitary waste.

ix. **Application of fertilizers** (see Part 2.3.5). Document any departures from the manufacturer specifications where appropriate.

7.2.7 Procedures for Inspection, Maintenance, and Corrective Action. Describe the procedures you will follow for maintaining your stormwater controls, conducting site inspections, and, where necessary, taking corrective actions, in accordance with Part 2.1.4, Part 4, and Part 5 of this permit. Also include:

a. The inspection schedule you will follow, which is based on whether your site is subject to Part 4.2 or Part 4.3, or whether your site qualifies for any of the reduced inspection frequencies in Part 4.4;

b. If you will be conducting inspections in accordance with the inspection schedule in Part 4.2.2, Part 4.3, or Part 4.4.1b, the location of the rain gauge or the address of the weather station you will be using to obtain rainfall data;

c. If you will be reducing your inspection frequency in accordance with Part 4.4.1b, the beginning and ending dates of the seasonally defined arid period for your area or the valid period of drought;

d. If you will be reducing your inspection frequency in accordance with Part 4.4.3, the beginning and ending dates of frozen conditions on your site; and

e. Any maintenance or inspection checklists or other forms that will be used.

7.2.8 Staff Training. Include documentation that the required personnel were, or will be, trained in accordance with Part 6.

7.2.9 Compliance with Other Requirements.

a. **Threatened and Endangered Species Protection.** Include documentation required in Appendix D supporting your eligibility with regard to the protection of threatened and endangered species and designated critical habitat.

b. **Historic Properties.** Include documentation required in Appendix E supporting your eligibility with regard to the protection of historic properties.

c. **Safe Drinking Water Act Underground Injection Control (UIC) Requirements for Certain Subsurface Stormwater Controls.** If you are using any of the following stormwater controls at your site, document any contact you have had with the applicable state agency[59] or EPA Regional Office responsible for implementing the requirements for underground injection wells in the Safe Drinking Water Act and EPA's implementing

[58] Even if you already have an SPCC or other spill prevention plan in existence, your plans will only be considered adequate if they meet all of the requirements of this Part, either as part of your existing plan or supplemented as part of the SWPPP.

[59] For state UIC program contacts, refer to the following EPA website: https://www.epa.gov/uic.

regulations at 40 CFR 144 -147. Such controls would generally be considered Class V UIC wells:

i. Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system);

ii. Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow; and

iii. Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system).

7.2.10 SWPPP Certification. You must sign and date your SWPPP in accordance with Appendix I, Part I.11.

7.2.11 Post-Authorization Additions to the SWPPP. Once you are authorized for coverage under this permit, you must include the following documents as part of your SWPPP:

a. A copy of your NOI submitted to EPA along with any correspondence exchanged between you and EPA related to coverage under this permit;

b. A copy of the acknowledgment letter you receive from NeT assigning your NPDES ID (*i.e., permit tracking number*);

c. A copy of this permit (an electronic copy easily available to the stormwater team is also acceptable).

7.3 ON-SITE AVAILABILITY OF YOUR SWPPP

You must keep a current copy of your SWPPP at the site or at an easily accessible location so that it can be made available at the time of an on-site inspection or upon request by EPA; a state, tribal, or local agency approving stormwater management plans; the operator of a storm sewer system receiving discharges from the site; or representatives of the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS).

EPA may provide access to portions of your SWPPP to a member of the public upon request. Confidential Business Information (CBI) will be withheld from the public, but may not be withheld from EPA, USFWS, or NMFS.[60]

If an on-site location is unavailable to keep the SWPPP when no personnel are present, notice of the plan's location must be posted near the main entrance of your construction site.

7.4 SWPPP MODIFICATIONS

[60] Information covered by a claim of confidentiality will be disclosed by EPA only to the extent of, and by means of, the procedures set forth in 40 CFR Part 2, Subpart B. In general, submitted information protected by a business confidentiality claim may be disclosed to other employees, officers, or authorized representatives of the United States concerned with implementing the CWA. The authorized representatives, including employees of other executive branch agencies, may review CBI during the course of reviewing draft regulations.

7.4.1 You must modify your SWPPP, including the site map(s), within seven (7) days of any of the following conditions:

a. Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP. This includes changes made in response to corrective actions triggered under Part 5. You do not need to modify your SWPPP if the estimated dates in Part 7.2.3f change during the course of construction;

b. To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;

c. If inspections or investigations by EPA or its authorized representatives determine that SWPPP modifications are necessary for compliance with this permit;

d. Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet the requirements of this permit, the following must be included in your SWPPP:

   i. A copy of any correspondence describing such measures and requirements; and

   ii. A description of the controls that will be used to meet such requirements.

e. To reflect any revisions to applicable federal, state, tribal, or local requirements that affect the stormwater controls implemented at the site; and

f. If applicable, if a change in chemical treatment systems or chemically enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

7.4.2 You must maintain records showing the dates of all SWPPP modifications. The records must include the name of the person authorizing each change (see Part 7.2.10 above) and a brief summary of all changes.

7.4.3 All modifications made to the SWPPP consistent with Part 7.4 must be authorized by a person identified in Appendix I, Part I.11.b.

7.4.4 Upon determining that a modification to your SWPPP is required, if there are multiple operators covered under this permit, you must immediately notify any operators who may be impacted by the change to the SWPPP.

8 HOW TO TERMINATE COVERAGE

Until you terminate coverage under this permit, you must comply with all conditions and effluent limitations in the permit. To terminate permit coverage, you must submit to EPA a complete and accurate Notice of Termination (NOT), which certifies that you have met the requirements for terminating in Part 8.

8.1 MINIMUM INFORMATION REQUIRED IN NOT

8.1.1 NPDES ID (*i.e., permit tracking number)* provided by EPA when you received coverage under this permit;

8.1.2 Basis for submission of the NOT (see Part 8.2);

8.1.3 Operator contact information;

8.1.4 Name of site and address (or a description of location if no street address is available); and

8.1.5 NOT certification.

8.2 CONDITIONS FOR TERMINATING CGP COVERAGE

You must terminate CGP coverage only if one or more of the following conditions has occurred:

8.2.1 You have completed all construction activities at your site and, if applicable, construction support activities covered by this permit (see Part 1.2.1c), and you have met the following requirements:

a. For any areas that (1) were disturbed during construction, (2) are not covered over by permanent structures, and (3) over which you had control during the construction activities, you have met the requirements for final vegetative or non-vegetative stabilization in Part 2.2.14b;

b. You have removed and properly disposed of all construction materials, waste and waste handling devices, and have removed all equipment and vehicles that were used during construction, unless intended for long-term use following your termination of permit coverage;

c. You have removed all stormwater controls that were installed and maintained during construction, except those that are intended for long-term use following your termination of permit coverage or those that are biodegradable; and

d. You have removed all potential pollutants and pollutant-generating activities associated with construction, unless needed for long-term use following your termination of permit coverage; or

8.2.2 You have transferred control of all areas of the site for which you are responsible under this permit to another operator, and that operator has submitted an NOI and obtained coverage under this permit; or

8.2.3 Coverage under an individual or alternative general NPDES permit has been obtained.

8.3 HOW TO SUBMIT YOUR NOT

You must use EPA's NPDES eReporting Tool (NeT) to electronically prepare and submit your NOT for the 2017 CGP.

To access NeT, go to https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting.

Waivers from electronic reporting may be granted as specified in Part 1.4.1. If the EPA Regional Office grants you approval to use a paper NOT, and you elect to use it, you must complete the form in Appendix K.

8.4 DEADLINE FOR SUBMITTING THE NOT

You must submit your NOT within 30 calendar days after any one of the conditions in Part 8.2 occurs.

8.5 EFFECTIVE DATE OF TERMINATION OF COVERAGE

Your authorization to discharge under this permit terminates at midnight of the calendar day that a complete NOT is submitted to EPA.

9 PERMIT CONDITIONS APPLICABLE TO SPECIFIC STATES, INDIAN COUNTRY LANDS, OR TERRITORIES

The provisions in this Part provide modifications or additions to the applicable conditions of this permit to reflect specific additional conditions required as part of the state or tribal CWA Section 401 certification process, or the Coastal Zone Management Act (CZMA) certification process, or as otherwise established by the permitting authority. The specific additional revisions and requirements only apply to activities in those specific states, Indian country, and areas in certain states subject to construction projects by Federal Operators. States, Indian country, and areas subject to construction by Federal Operators not included in this Part do not have any modifications or additions to the applicable conditions of this permit.

9.1 EPA Region 1

9.1.1 NHR100000 State of New Hampshire

a. If you disturb 100,000 square feet or more of contiguous area, you must also apply for an Alteration of Terrain (AoT) permit from DES pursuant to RSA 485- A:17 and Env-Wq 1500. This requirement also applies to a lower disturbance threshold of 50,000 square feet or more when construction occurs within the protected shoreline under the Shoreland Water Quality Protection Act (see RSA 483-B and Env-Wq 1400). A permit application must also be filed if your project disturbs an area of greater than 2,500 square feet, is within 50 feet of any surface water, and has a flow path of 50 feet or longer disturbing a grade of 25 percent or greater. Project sites with disturbances smaller than those discussed above, that have the potential to adversely affect state surface waters, are subject to the conditions of an AoT General Permit by Rule.

b. You must determine that any excavation dewatering discharges are not contaminated before they will be authorized as an allowable non-stormwater discharge under this permit (see Part 1.2.2). The water is considered uncontaminated if there is no groundwater contamination within 1,000 feet of the groundwater dewatering location. Information on groundwater contamination can be generated over the Internet via the NHDES web site http://des.nh.gov/ by using the One Stop Data Mapper at http://des.nh.gov/onestop/gis.htm. If it is determined that the groundwater to be dewatered is near a remediation or other waste site you must apply for the Remediation General Permit (see https://www3.epa.gov/region1/npdes/rgp.html.)

c. You must treat any uncontaminated excavation dewatering discharges as necessary to remove suspended solids and turbidity. The discharges must be sampled at least once per week during weeks when discharges occur. Samples must be analyzed for total suspended solids (TSS) or turbidity and must meet monthly average and daily maximum limits of 50 milligrams per liter (mg/L) and 100 mg/L, respectively for TSS or 33 mg/l and 67 mg/l, respectively for turbidity. TSS (a.k.a. Residue, Nonfilterable) or turbidity sampling and analysis must be performed in accordance with Tables IB and II in 40 CFR 136.3 (http://www.ecfr.gov/cgi-bin/text-idx?SID=0243e3c4283cbd7d8257eb6afc7ce9a2&mc=true&node=se40.25.136_13&rgn=div8). Records of any sampling and analysis must be maintained and kept with the SWPPP for at least three years after final site stabilization.

d. Construction site owners and operators must consider opportunities for post-construction groundwater recharge using infiltration best management practices

(BMPs) during site design and preparation of the SWPPP. If your construction site is in a town that is required to obtain coverage under the NPDES General Permit for discharges from Municipal Separate Storm Sewer Systems (MS4) you may be required to use such practices. The SWPPP must include a description of any on-site infiltration that will be installed as a post-construction stormwater management measure or reasons for not employing such measures such as 1) The facility is located in a wellhead protection area as defined in RSA 485- C:2; or 2) The facility is located in an area where groundwater has been reclassified to GAA, GAI or GA2 pursuant to RSA 485-C and Env-DW 901; or 3) Any areas that would be exempt from the groundwater recharge requirements contained in Env-Wq 1507.04, including all land uses or activities considered to be a "High-load Area" (see Env-Wq 1502.30). For design considerations for infiltration measures see Env-Wq 1508.06.

e. Appendix F contains a list of Tier 2, or high quality waters. Although there is no official list of tier 2 waters, it can be assumed that all NH surface waters are tier 2 for turbidity unless 1) the surface water that you are proposing to discharge into is listed as impaired for turbidity in the states listing of impaired waters (see Surface Water Quality - Watershed Report Cards at http://des.nh.gov/organization/divisions/water/wmb/swqa/report_cards.htm) or 2) sampling upstream of the proposed discharge location shows turbidity values greater than 10 NTU. A single grab sample collected during dry weather (no precipitation within 48 hours) is acceptable.

f. To ensure compliance with RSA 485-C, RSA 485-A, RSA 485-A:13, I(a), Env-Wq 1700 and Env-Wq 302, the following information may be requested by NHDES. This information must be kept on site unless you receive a written request from NHDES that it be sent to the address shown in Part 9.1.4 (g).

    i. A site map required in Part 7.2.4, showing the type and location of all post-construction infiltration BMPs utilized at the facility or the reason(s) why none were installed;

    ii. A list of all non-stormwater discharges that occur at the facility, including their source locations and the control measures being used (see Part 1.2.2).

    iii. Records of sampling and analysis of TSS required for construction dewatering discharges (see Part 9.1.4 (c)).

g. All required or requested documents must be sent to:

    NH Department of Environmental Services, Wastewater Engineering Bureau,
    Permits & Compliance Section
    P.O. Box 95
    Concord, NH 03302-0095

9.1.2 VTR10F000 Areas in the State of Vermont subject to construction by a Federal Operator

a. Earth disturbance at any one time is limited to five acres.

b. All areas of earth disturbance must have temporary or final stabilization within 14 days of the initial disturbance. After this time, disturbed areas must be temporarily or permanently stabilized in advance of any runoff producing event. A runoff producing event is an event that produces runoff from the construction site. Temporary stabilization is not required if the work is occurring in a self-contained

excavation (i.e. no outlet) with a depth of two feet or greater (e.g. house foundation excavation, utility trenches). Areas of a construction site that drain to sediment basins are not considered eligible for this exemption, and the exemption applies only to the excavated area itself.

c. The use of the cationic polymers is prohibited unless approved under a site-specific plan.

d. Site inspections on active construction sites shall be conducted daily during the period from October 15 – April 15.

e. Any applicant under EPA's CGP shall allow authorized Agency representatives, at reasonable times and upon presentation of credentials, to enter upon the project site for purposes of inspecting the project and determining compliance with this Certification.

f. The Agency may reopen and alter or amend the conditions of this Certification over the life of the project when such action is necessary to assure compliance with the VWQS.

9.2 EPA Region 3

9.2.1 DCR100000 District of Columbia

a. The permittee must comply with the District of Columbia Water Pollution Control Act of 1984, as amended, (D.C. Official Code § 8-103.01 et seq.) and its implementing regulations in Title 21, Chapters 11 and 19 of the District of Columbia Municipal Regulations. Nothing in this permit will be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to District of Columbia laws and regulations.

b. The permittee must comply with the District of Columbia Stormwater Management, and Soil Erosion and Sediment Control in Chapter 5 of Title 21 of the District of Columbia Municipal Regulations.

c. The permittee must comply with District of Columbia Flood Management control in Chapter 31 of Title 20 of the District of Columbia Municipal Regulations.

d. The Department may request a copy of the Stormwater Pollution Prevention Plan (SWPPP) and the permittee is required to submit the SWPPP to the Department within 14 days of such request. The Department may conduct an inspection of any facility covered by this permit to ensure compliance with District's law requirements, including water quality standards. The Department may enforce its certification conditions.

e. The Department may require the permittee to perform water quality monitoring during the permit term if monitoring is necessary for the protection of public health or the environment as designated under the authority in Chapter 19 of Title 21 of the District of Columbia Municipal Regulations.

f. The Department may require the permittee to provide measurable verification of the effectiveness of Best Management Practices (BMPs) and other control measures used in the stormwater management program, including water quality monitoring.

g. The Department has determined that compliance with this permit does not protect the permittee from enforcement actions deemed necessary by the Department

under its associated regulations to address an imminent threat to public health or a significant adverse environmental impact which results in a violation of the District of Columbia Water Pollution Control Act of 1984, as amended, (D.C. Official Code § 8-103.01 et seq.) and its implementing regulations.

h. The Department reserves the right to modify this Section 401 Water Quality Certification if any changes, modifications, or deletions are made to this general permit. In addition, the Department reserves the right to add and/or alter the terms and conditions of this Section 401 Water Quality Certification to carry out its responsibilities during the term of this general permit with respect to water quality, including any revisions to District of Columbia Water Quality Standards in Chapter 11 of Title 21 of the District of Columbia Municipal Regulations.

i. Should any violation of the District's Water Quality Standards, or the conditions of this Section 401 Water Quality Certification occur, the Department will direct the permittee to correct the violation(s). The Department has the right to take any action as authorized by the District laws and regulations to address the violations of this permit or the Water Pollution Control Act and implementing regulations. Substantial civil and criminal penalties are authorized for discharging into District waters in violation of an order or permit issued by the Department. This Section 401 Water Quality Certification does not relieve the permittee of the duty to comply with other applicable District's statutes and regulations.

j. The permittee must submit copies of Notice of Intent (NOI) and Notice of Termination to DOEE at the same time these documents are submitted to EPA.

k. The permittee shall allow DOEE to inspect any facilities, equipment, practices, or operations regulated or required under this permit and to access records maintained under the conditions of this permit.

l. All required or requested documents shall be signed and sent to the: Department of Energy & Environment, 1200 First Street, N.E., 5th Floor, Washington, DC 20002, Attention: Associate Director, Inspection and Enforcement Division.

9.2.2 DER10F000 Areas in the State of Delaware subject to construction by a Federal Operator

a. Federal agencies engaging in construction activities must submit, to DNREC, a sediment and stormwater management (S&S) plan and obtain approval from DNREC in accordance with 7 Del. C. §4010, 7 DE Admin. Code 5101, and 7 DE Admin. Code 7201.

b. Federal agencies engaging in construction activities must provide for construction review by a certified construction reviewer in accordance with 7 Del. C. §§4010 & 4013 and 7 DE Admin. Code 5101, subsection 6.1.6.

c. Federal agencies engaging in construction activities must certify that all responsible personnel involved in the construction project will have attended the blue card training prior to initiation of any land disturbing activity – *see* 7 Del. C. §§ 4002 & 4014 and 7 DE Admin. Code 5101.

9.3 EPA Region 5

9.3.1 MNR10I000 Indian country within the State of Minnesota

9.3.1.1 Fond du Lac Band of Lake Superior Chippewa. The following conditions apply only to discharges on the Fond du Lac Band of Lake Superior Chippewa Reservation:

a. A copy of the Stormwater Pollution Prevention Plan (SWPPP) must be submitted to the Office of Water Protection at least fifteen (15) days in advance of sending the Notice of Intent (NOI) to EPA. The SWPPP can be submitted electronically to richardgitar@FDLREZ.com or by hardcopy sent to:

Fond du Lac Reservation
Office of Water Protection
1720 Big Lake Road
Cloquet, MN 55720

CGP applicants are encouraged to work with the FDL Office of Water Protection in the identification of all proposed receiving.

b. Copies of the Notice of Intent (NOI) and the Notice of Termination (NOT) must be sent to the Fond du Lac Office of Water Protection at the same time they are submitted to EPA.

c. The turbidity limit shall NOT exceed 10% of natural background within the receiving water(s) as determined by Office of Water Protection staff.

d. Turbidity sampling must take place within 24 hours of a ½-inch or greater rainfall event. The results of the sampling must be reported to the Office of Water Protection within 7 days of the sample collection. All sample reporting must include the date and time, location (GPS: UTM/Zone 15), and NTU. CGP applicants are encouraged to work with the Office of Water Protection in determining the most appropriate location(s) for sampling.

e. Receiving waters with open water must be sampled for turbidity prior to any authorized discharge as determined by Office of Water Protection staff. This requirement only applies to receiving waters in which no ambient turbidity data exists.

f. This Certification does not pertain to any new discharge to Outstanding Reservation Resource Waters (ORRW) as described in §105 b.3. of the Fond du Lac Water Quality Standards (Ordinance #12/98, as amended). Although additional waters may be designated in the future, currently Perch Lake, Rice Portage Lake, Miller Lake, Deadfish Lake, and Jaskari Lake are designated as ORRWs. New dischargers wishing to discharge to an ORRW must obtain an individual permit from EPA for stormwater discharges from large and small construction activities.

g. All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in the Water Quality Standards of the Fond du Lac Reservation, Ordinance 12/98, as amended. This includes, but is not limited to, the prevention of any discharge that causes a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of water of the Fond du Lac Reservation for any of the uses designated in the Water Quality Standards of the Fond du Lac Reservation. These uses include wildlife, aquatic life, warm water fisheries, cold water fisheries, subsistence fishing (netting), primary contact recreation, secondary

contact recreation, cultural, wild rice areas, aesthetic waters, agriculture, navigation, and commercial.

h. Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the Fond du Lac Reservation. All spills must be reported to the appropriate emergency management agency (National Response Center AND the State Duty Officer), and measures shall be taken immediately to prevent the pollution of waters of the Fond du Lac Reservation, including groundwater. The Fond du Lac Office of Water Protection must also be notified immediately of any spill regardless of size.

i. This certification does not authorize impacts to cultural, historical, or archeological features or sites, or properties that may be eligible for such listing.

9.3.1.2 Grand Portage Band of Lake Superior Chippewa. The following conditions apply only to discharges on the Grand Portage Band of Lake Superior Chippewa Reservation:

a. The CGP authorization is for construction activities that may occur within the exterior boundaries of the Grand Portage Reservation in accordance to the Grand Portage Land Use Ordinance. The CGP regulates stormwater discharges associated with construction sites of one acre or more in size. Only those activities specifically authorized by the CGP are authorized by this certification (the "Certification"). This Certification does not authorize impacts to cultural, historical, or archeological features or sites, or properties that may be eligible for listing as such.

b. All construction stormwater discharges authorized by the CGP must comply with the Water Quality Standards and Water Resources Ordinance, as well as Applicable Federal Standards (as defined in the Water Resources Ordinance). As such, appropriate steps must be taken to ensure that petroleum products or other chemical pollutants are prevented from entering the Waters of the Reservation (as defined in the Water Resources Ordinance). All spills must be reported to the appropriate emergency-management agency, and measures must be taken to prevent the pollution of the Waters of the Reservation, including groundwater.

c. The 2017 CGP requires inspections and monitoring reports of the construction site stormwater discharges by a qualified person. Monitoring and inspection reports must comply with the minimum requirements contained in the 2017 CGP. The monitoring plan must be prepared and incorporated into the Stormwater Pollution Prevention Plan (the "SWPPP"). A copy of the SWPPP must be submitted to the Board at least 30 days in advance of sending the requisite Notice of Intent to EPA. The SWPPP should be sent to:

Grand Portage Environmental Resources Board
P.O. Box 428
Grand Portage, MN 55605

Copies of the Notice of Intent and Notice of Termination required under the CGP must be submitted to the Board at the address above at the same time they are submitted to the EPA.

d. If requested by the Grand Portage Environmental Department, the permittee must provide additional information necessary for a case-by-case eligibility determination to assure compliance with the Water Quality Standards and any Applicable Federal Standards.

e. Discharges that the Board has determined to be or that may reasonably be expected to be contributing to a violation of Water Quality Standards or Applicable Federal Standards are not authorized by this Certification.

f. The Board retains full authority provided by the Water Resources Ordinance to ensure compliance with and to enforce the provisions of the Water Resource Ordinance and Water Quality Standards, Applicable Federal Standards, and these Certification conditions.

g. Appeals related to Board actions taken in accordance with any of the preceding conditions may be heard by the Grand Portage Tribal Court.

9.3.2 WIR10I000 Indian country within the State of Wisconsin, except the Sokaogon Chippewa (Mole Lake) Community

9.3.2.1 Bad River Band of Lake Superior Tribe of Chippewa Indians: The following conditions apply only to discharges on the Bad River Band of the Lake Superior Tribe of Chippewa Indians Reservation:

a. Only those activities specifically authorized by the CGP are authorized by this Certification. This Certification does not authorize impacts to cultural properties, or historical sites, or properties that may be eligible for listing as such.[61, 62]

b. All projects which are eligible for coverage under the CGP and are located within the exterior boundaries of the Bad River Reservation shall be implemented in such a manner that is consistent with the Tribe's Water Quality Standards (WQS) in order to protect Reservations waters that may be impacted by stormwater discharge including embankments, outlets, adjacent streambanks, slopes, and downstream waters.[63]

c. Operators are not eligible to obtain authorization under the CGP for all new discharges to an Outstanding Tribal Resource Water (or Tier 3 water).[64] Outstanding Tribal Resource Waters, or Tier 3 waters, include the following: Kakagon Slough and the lower wetland reaches of its tributaries that support wild rice, Kakagon River, Bad River Slough, Honest John Lake, Bog Lake, a portion of Bad River, from where it enters the Reservation through the confluence with the White River, and Potato River.[65]

d. An operator proposing to discharge to an Outstanding Resource Water (or Tier 2.5 water) under the CGP must comply with the antidegradation provisions of the Tribe's WQS. Outstanding Resource Waters, or Tier 2.5 waters, include the following: a portion of Bad River, from downstream the confluence with the White River to Lake Superior, White River, Marengo River, Graveyard Creek, Bear Trap Creek, Wood Creek, Brunsweiler River, Tyler Forks, Bell Creek, and Vaughn Creek.[66] The antidegradation demonstration materials described in provision E.4.iii. must be submitted to the following address:

[61] Bad River Band of Lake Superior Tribe of Chippewa Indians Water Quality Standards adopted by Resolution No. 7-6-11-441 (hereafter, Tribe's WQS).

[62] 36 C.F.R. § 800.16(l)(2).

[63] See footnote 61.

[64] Tribe's WQS: See provisions E.3.ii. and E.4.iv.

[65] Tribe's WQS: See provision E.2.iii.

[66] Tribe's WQS: See provision E.2.ii.

Bad River Tribe's Natural Resources Department
Attn: Water Resources Specialist
P.O. Box 39
Odanah, WI 54861

e. An operator proposing to discharge to an Exceptional Resource Water (or Tier 2 water) under the CGP must comply with the antidegradation provisions of the Tribe's WQS. Exceptional Resource Waters, or Tier 2 waters, include the following: any surface water within the exterior boundaries of the Reservation that is not specifically classified as an Outstanding Resource Water (Tier 2.5 water) or an Outstanding Tribal Resource Water (Tier 3 water).[67] The antidegradation demonstration materials described in provision E.4.ii. must be submitted to the following address:

Bad River Tribe's Natural Resources Department
Attn: Water Resources Specialist
P.O. Box 39
Odanah, WI 54861

f. Projects utilizing cationic treatment chemicals[68] within the Bad River Reservation boundaries are not eligible for coverage under the CGP.[69]

g. A discharge to a surface water within the Bad River Reservation boundaries shall not cause or contribute to an exceedance of the turbidity criterion included in the Tribe's WQS, which states: Turbidity shall not exceed 5 NTU over natural background turbidity when the background turbidity is 50 NTU or less, or turbidity shall not increase more than 10% when the background turbidity is more than 50 NTU.[70]

h. All projects which are eligible for coverage under the CGP within the exterior boundaries of the Bad River Reservation must comply with the Bad River Reservation Wetland and Watercourse Protection Ordinance, or Chapter 323 of the Bad River Tribal Ordinances, including the erosion and sedimentation control, natural buffer, and stabilization requirements. Questions regarding Chapter 323 and requests for permit applications can be directed to the Wetlands Specialist in the Tribe's Natural Resources Department at (715) 682-7123 or wetlands@badriver-nsn.gov.

i. An operator of a project, which is eligible for coverage under the CGP, that would result in an allowable discharge under the CGP occurring within the exterior boundaries of the Bad River Reservation must notify the Tribe prior to the commencing earth-disturbing activities.[71, 72] The operator must submit a copy of the Notice of Intent (NOI) to the following addresses at the same time it is submitted to the U.S. EPA:

[67] Tribe's WQS: See provision E.2.i.

[68] See definition of cationic treatment chemicals in Appendix A of the CGP.

[69] Tribe's WQS: See provisions E.6.ii.a. and E.6.ii.c.

[70] Tribe's WQS: See provision E.7.iii.

[71] See footnote 61.

[72] See footnote 62.

Bad River Tribe's Natural Resources Department
Attn: Water Resources Specialist
P.O. Box 39
Odanah, WI 54861

Bad River Tribe's Natural Resources Department
Attn: Tribal Historic Preservation Officer (THPO)
P.O. Box 39
Odanah, WI 54861

The operator must also submit a copy of the Notice of Termination (NOT) to the above addresses at the same time it is submitted to the U.S. EPA.

j. The Tribal Historic Preservation Officer (THPO) must be provided 30 days to comment on the project.[73]

k. The operator must obtain THPO concurrence in writing. This written concurrence will outline measures to be taken to prevent or mitigate effects to historic properties. For more information regarding the specifics of the cultural resources process, see 36 CFR Part 800. A best practice for an operator is to consult with the THPO during the planning stages of an undertaking.[74]

l. An operator of a project, which is eligible for coverage under the CGP, that would result in an allowable discharge under the CGP occurring within the exterior boundaries of the Bad River Reservation must submit a copy of the Stormwater Pollution Prevention Plan (SWPPP) to the following address at the same time as submitting the NOI: [75]

Bad River Tribe's Natural Resources Department
Attn: Water Resources Specialist
P.O. Box 39
Odanah, WI 54861

m. Any corrective action reports that are required under the CGP must be submitted to the following address within one (1) working day of the report completion: [76]

Bad River Tribe's Natural Resources Department
P.O. Box 39
Odanah, WI 54861

n. An operator shall be responsible for meeting any additional permit requirements imposed by the U.S. EPA necessary to comply with the Tribe's antidegradation policies if the discharge point is located upstream of waters designated by the Tribe.[77]

[73] 36 C.F.R. § 800.3(c)(4).

[74] 36 C.F.R. § 800.3(b).

[75] See footnote 61.

[76] See footnote 61.

[77] See footnote 61.

9.3.2.2 Lac du Flambeau Band of Lake Superior Tribe of Chippewa Indians: The following conditions apply only to discharges on the Lac du Flambeau Band of the Lake Superior Tribe of Chippewa Indians Reservation:

a. A copy of the Stormwater Pollution Prevention Plan must be submitted to the following office, for the Traival environmental review process, at least thirty (30) days in advance of sending the Notice of Intent (NOI) to EPA:

Lac du Flambeau
Tribal Land Management
P.O. Box 279
Lac du Flambeau, WI 54538

CGP applicants are encouraged to work with the LdF Water Resources Program in the identification of all proposed receiving waters.

b. Copies of the NOI and the Notice of Termination (NOT) must be sent to the LdF Water Resources Program at the same time they are submitted to EPA.

c. All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in the Water Quality Standards of the Lac du Flambeau Reservation. This includes, but is not limited to, the prevention of any discharge that cause a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of water of the Lac du Flambeau Reservation for any of the uses designated in the Water Quality Standards of the Lac du Flambeau Reservation.

d. Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the Lac du Flambeau Reservation. All spills must be reported to the appropriate emergency management agency, and measures shall be taken immediately to prevent the pollution of waters of the Lac du Flambeau reservation, including groundwater.

e. This certification does not authorize impacts to cultural, historical, or archeological features or sties, or properties that may be eligible for such listing.

f. Due to the significant ecological and cultural importance of the Lac du Flambeau Reservation, any operator requesting a permit for a point source discharge of pollutants (i.e., discharge) associated with the Stormwater Discharge will need a stormwater pollution prevention plan in place that does not violate Lac du Flambeau Water Quality Standards to protect Reservation Waters.

9.4 EPA Region 6

9.4.1 NMR100000 State of New Mexico, except Indian country

a. If construction dewatering activities are anticipated at a site, permittees must complete the following steps:

i. Investigative information must be documented in the facility SWPPP.

ii. Refer to the GWQB Mapper at https://gis.web.env.nm.gov/GWQB/ AND the PSTB Mapper (Go Mapper) at https://gis.web.env.nm.gov/GoNM/

and check if the following sources are located within the noted distance from your anticipated construct site groundwater dewatering activity:

Project Location Relative to a Source of Potential Groundwater Contamination	***Constituents likely to be required for testing***
Within 0.5 mile of an open Leaking Underground Storage Tank (LUST) site	*BTEX (Benzene, Toluene, Ethylbenzene, and Xylene) plus additional parameters depending on site conditions.**
Within 0.5 mile of an open Voluntary Remediation site	*All parameters listed in Appendix A (or an alternate list approved by the NMED SWQB)***
Within 0.5 mile of an open RCRA Corrective Action Site	
Within 0.5 mile of an open Abatement Site	
Within 0.5 mile of an open Brownfield Site	
Within 1.0 mile or more of a Superfund site or National Priorities List (NPL) site with associated groundwater contamination.	

**For further assistance determining whether dewatering may encounter impacted groundwater, the permittee may contact the NMED Ground Water Quality Bureau at: 505-827-2965.*

***EPA approved-sufficiently sensitive methods must be used - approved methods are listed in 40 CFR Part 136.3.*

ii. Indicate on the NOI that dewatering activities are anticipated. Provide information on flow and potential to encounter impacted groundwater.

iii. Permittee must test the quality of the groundwater according to the chart above. Hardness and pH must also be measured.

iv. Permittee must send test result data to EPA Region 6 and the NMED Surface Water Quality Bureau. If the test data exceed standards, it cannot be discharged from the construction site into surface waters under this permit. Discharge to surface waters must be conducted under a separate NPDES individual permit to ensure proper treatment and disposal.

v. If disposal will be to the ground surface or in an unlined pond, the permittee must submit an NO/ to the NMED Ground Water Quality Bureau.

b. Operators are not eligible to obtain authorization under this permit for all new and existing storm water discharges to outstanding national resource waters (ONRWs) (also referred to as "Tier 3" waters.)

c. Operators who intend to obtain authorization under this permit for new and existing storm water discharges from construction sites must satisfy the following condition:

i. The SWPPP must include site-specific interim and permanent stabilization, managerial, and structural solids, erosion and sediment control best management practices (BMPs) and/or other controls that are designed to prevent to the maximum extent practicable an increase in the sediment yield and flow velocity from pre-construction, pre-development conditions to assure that applicable standards in 20.6.4.NMAC, including the antidegradation policy, or TMDL waste load allocations (WLAs) are met. This requirement applies to discharges both during construction and after construction operations have been completed. The SWPPP must identify

and document the rationale for selecting these BMPs and/or other controls. The SWPPP must also describe design specifications, construction specifications, maintenance schedules (including a long term maintenance plan), criteria for inspections, and expected performance and longevity of these BMPs. For sites greater than 5 acres in size, BMP selection must be made based on the use of appropriate soil loss prediction models (i.e. SEDCAD, RUSLE, SEDIMOT, MULTISED, etc.) OR equivalent generally accepted (by professional erosion control specialists) soil loss prediction tools.

ii. For all sites, the operator(s) must demonstrate, and include documentation in the SWPPP, that implementation of the site-specific practices will assure that the applicable standards or TMDL WLAs are met, and will result in sediment yields and flow velocities that, to the maximum extent practicable, will not be greater than the sediment yield levels and flow velocities from preconstruction, pre-development conditions.

iii. All SWPPPs must be prepared in accordance with good engineering practices by qualified (e.g. CPESC certified, engineers with appropriate training) erosion control specialists familiar with the use of soil loss prediction models and design of erosion and sediment control systems based on these models (or equivalent soil loss prediction tools). Qualifications of the preparer (e.g., professional certifications, description of appropriate training) must be documented in the SWPPP. The operator(s) must design, implement, and maintain BMPs in the manner specified in the SWPPP.

d. Permittees can call 505-827-9329 for emergencies at any time and 505-476-6000 for non-emergencies during business hours from 5am-5pm, Monday through Friday.

9.4.2 NMR10I000 Indian country within the State of New Mexico, except Navajo Reservation Lands that are covered under Arizona permit AZR10I000 and Ute Mountain Reservation Lands that are covered under Colorado permit COR10I000.

9.4.2.1 Pueblo of Isleta. The following conditions apply only to discharges on the Pueblo of Isleta Reservation:

a. CGP at 1.3 Prohibited discharges: Stormwater discharges associated with construction activity that EPA or the Pueblo of Isleta, prior to authorization under this perm it, determines will cause, have the reasonable potential to cause, or may reasonably be expected to contribute to a violation or excursion of any applicable water quality standard, including the antidegradation policy, or the impairment of a designated use of receiving waters are not authorized by this permit.

b. CGP at 1.4.1 How to Submit Your NOI: The operator shall provide a copy of the Notice of Intent ("NOI") to the Pueblo of Isleta at the same time it is submitted to the U.S. Environmental Protection Agency, for projects occurring within the exterior boundaries of the Pueblo of Isleta. The operator shall also notify the Pueblo of Isleta when it has submitted the Notice of Termination ("NOT"). The NOI and NOT shall be sent to the Pueblo of Isleta at the following address:

Water Quality Control Officer
Pueblo of Isleta
Environment Department
PO Box 1270

Isleta, NM 87022
(505) 869-9819
E-mail: POI36871@isletapueblo.com

Overnight/Express Mail Delivery
Pueblo of Isleta
Environment Department
6 Sagebrush St.
Albuquerque, NM 87105

c. CGP at 1.5 Requirement to post a notice of your permit coverage: Amend to read: "You must post a sign or other notice of your permit coverage at a safe, publicly accessible location in close proximity to the construction site. The notice must be located so that it is visible from the public road or tribal road that is nearest to the active part of the construction site…"

d. CGP at 7.2.6 Description of stormwater controls: The SWPPP will be considered to be incomplete if the operator has not coordinated requirements under this Part with the Pueblo of Isleta Environment Department.

e. CGP I.12.6.1 at pg.I-6 of 8. The Pueblo of Isleta requests notification within 10 hours (rather than 24 hrs.) if health or the environment become endangered.

f. CGP at I.12.2 Anticipated noncompliance: Amend to read: "You must give advance notice to EPA and the Pueblo of Isleta at the address indicated in 1.4.1(a) of any planned changes in the permitted facility or activity which may results in noncompliance with permit requirements."

g. CGP at I.12.6.1: Any noncompliance for projects within the exterior boundaries of the Pueblo of Isleta which may endanger health or the environment shall be reported directly to the EPA Regional Office [(see contacts at https://www2.epa.gov/national-pollutant-discharge-elimination-system-npdes/contact-us-stormwater#regional)I and to the Pueblo of Isleta Water Quality Control Officer. Any information must be provided orally with n 12 hours of the time you become aware of the circumstances. Other requirements of this Part for a written submission apply. Electronic communication (E-mail) shall be provided as soon as practical. Verbal notice shall be provided to:

Water Quality Control Officer
Pueblo of Isleta
E-mail: POI36871@isletapueblo.com
(505) 869-9819
(505) 917-8346 mobile
(505) 869-3030 Police Dispatch

h. CGP at 2.2 Erosion and sediment control requirements: Erosion and sediment controls shall be designed to retain sediment on-site.

i. CGP at 2.2 Under Sediment control requirements, Standard Permit Condition Duty to Mitigate Volumes of sediment at or over (five) 5 cubic yards must be removed and placed for disposal within a tribally approved sediment Disposal Site, located on Pueblo of Isleta lands. CGP 2.2 at pg. 8.

j. Under Minimize erosion, a permittee must secure permission from the Pueblo or affected Pueblo of Isleta land assignment owner if a dissipation device needs to

be placed up- or down- elevation of a given construction site. CGP 2.2.11 at pg. 11.

k. CGP at 2.3.6 Emergency spill notification requirements: You must notify the Pueblo of Isleta Water Quality Control Officer and National Response Center (NRC) [at (800) 424-8802 or, in the Washington, DC metropolitan area, call (202) 267-2675 in accordance with the requirements of 40 CFR 110, 40 CFR 117, and 40 CFR 302] as soon as you have knowledge of the release. Verbal and electronic notice shall be provided as specified in I.12.6.1

l. CGP at C.3 Equivalent analysis waiver: Parties wishing to apply for an Equivalent Analysis Waiver (see Appendix D, Section C) must provide a copy of the waiver analysis to the Pueblo of Isleta Water Quality Control Officer at the address indicated in 1.4.1 (a).

9.4.2.2 Pueblo of Sandia. The following conditions apply only to discharges on the Pueblo of Sandia Reservation:

a. Only those activities specifically authorized by the CGP are authorized by the Pueblo of Sandia's Water Quality certification. The Pueblo of Sandia's Water Quality Certification does not authorize impact to cultural properties, historical sites or properties that may be eligible as such.

b. Copies of all Notices of Intent (NOI) submitted to the EPA must also be sent concurrently to the Pueblo of Sandia at the following address. Discharges are not authorized by this permit unless an accurate and complete NOI has been submitted to the Pueblo of Sandia, either by mail or electronically.

Regular U.S. Delivery Mail:
Pueblo of Sandia Environment Department
Attention: Scott Bulgrin, Water Quality Manager
481 Sandia Loop
Bernalillo, New Mexico 87004

Electronically:
sbulgrin@sandiapueblo.nsn.us

c. Any correspondences between the applicant and EPA related to analytical data, written reports, corrective action, enforcement, monitoring, or an adverse incident written reports should likewise be routed to the Pueblo of Sandia at the above address.

d. The Stormwater Pollution Prevention Plan (SWPPP) must be available to the Pueblo of Sandia Environment Department either electronically or hard copy upon request for review. The SWPPP must be made available at least fourteen (14) days before construction begins. The fourteen (14) day period will give Pueblo staff time to become familiar with the project site, prepare for construction site inspections, and determine compliance with the Pueblo of Sandia Water Quality Standards. Failure to provide a SWPPP to the Pueblo of Sandia may result in the delay or denial of the construction project.

e. If requested by the Pueblo of Sandia Environment Department, the permittee must provide additional information necessary for a case-by-case eligibility determination to assure compliance with the Pueblo of Sandia Water Quality Standards and/or applicable Federal Standards not authorized by this certification.

f. An "Authorization to Proceed Letter" with site specific mitigation requirements may

be sent out to the permittee when a review of the NOI and SWPPP, on a case- by-case basis is completed by the Pueblo of Sandia Environment Department. This approval will allow the application to proceed if all mitigation requirements are met.

g. The Pueblo of Sandia will not allow Small construction Waivers (Appendix C) or the Rainfall Erosivity Waiver (Appendix C.1) to be granted for any small construction activities.

h. Before submitting a Notice of Termination (NOT) to the EPA, permittees must clearly demonstrate to the Pueblo of Sandia Environment Department through a site visit or documentation that requirements for site stabilization have been met and any temporary erosion control structures have been removed. A short letter stating the NOT is acceptable and all requirements have been met will be sent to the permittee to add to the permittee's NOT submission to EPA.

i. Copies of all NOT submitted to the EPA must also be sent concurrently to the Pueblo of Sandia through the mail or electronically.

Regular U.S. Delivery Mail:
Pueblo of Sandia Environment Department
Attention: Scott Bulgrin, Water Quality Manager
481 Sandia Loop
Bernalillo, New Mexico 87004

Electronically:
sbulgrin@sandiapueblo.nsn.us

j. The Pueblo of Sandia may require the permittee to perform water quality monitoring for pH, turbidity, and total suspended solids (TSS) during the permit term if the discharge is to a surface water leading to the Rio Grande for the protection of public health and the environment.

9.4.2.3 Pueblo of Santa Ana. The following conditions apply only to discharges on the Pueblo of Santa Ana Reservation:

a. The permittee shall provide a copy of the Notice of Intent (NOI) to the Pueblo of Santa Ana (the Pueblo), at the same time it is submitted to the U.S. Environmental Protection Agency (EPA), for projects with discharges onto the lands of the Pueblo as defined in the Pueblo's antidegradation policy within the Pueblo of Santa Ana Water Quality Standards.

b. The permittee shall provide a final copy of the Stormwater Pollution Prevention Plan (SWPPP) to the Pueblo that is associated with any project identified in the NOI, at the same time that an NOI is submitted to the EPA. The SWPPP should include any projects with discharges onto the lands of the Pueblo as defined in

the antidegradation policy within the Pueblo of Santa Ana Water Quality Standards.

c. The operator shall provide copies of inspections reports and of corrective action reports to the Pueblo at the address below for review, upon request.

d. Upon completion of the project identified in the NOI, the permittee will submit a Notice of Termination (NOT) to the Pueblo.

e. All required or requested permittee specific information identified above shall be submitted to the following address:

Pueblo of Santa Ana Department of Natural Resources,
Attention: Water Resources Division
2 Dove Road
Santa Ana Pueblo, NM 87004

f. Discharges are not authorized by permittee unless an accurate and complete NOI and SWPPP have been submitted to the Pueblo. Failure to provide an accurate and complete NOI and SWPPP may result in a denial of the discharge permit or a delay in groundbreaking or construction.

g. The permittee will not proceed with site work until authorized by the Pueblo. The Pueblo requires review of the complete and final SWPPP before authorization to proceed. The Pueblo will provide an "Authorization to Process" notice after review and approval of the SWPPP.

h. The permittee could be required to perform water quality monitoring, sampling or analysis during the active permit dates for constituents determined by the Pueblo.

i. Before submitting a NOT, permittees must certify to the Pueblo's Department of Natural Resources in writing that requirements for site stabilization have been met, and any temporary erosion control structures have been removed. Documentation of the Pueblo's review that such requirements have been reviewed and met will be provided for the permittee to add to the permittee's NOT submission to EPA. Copies of all NOT submitted to the EPA must also be sent to the Pueblo at the address provided above.

9.4.2.4 Pueblo of Santa Clara. The following conditions apply only to discharges on the Pueblo of Santa Clara Reservation:

a. The operator must provide a copy of the Notice of Intent (NOI) and Notice of Termination (NOT) to the Santa Clara Pueblo Governor's Office at the same time it is provided to the US Environmental Protection Agency.

b. A copy of the Storm water Pollution Prevention Plan shall be made available to the Pueblo of Santa Clara staff upon request.

9.4.2.5 Pueblo of Tesuque. The following conditions apply only to discharges on the Pueblo of Tesuque Reservation:

a. Based on the Section 401 Certification provisions within the CWA, no discharges that will exceed or cause the exceedance of the Pueblo of Tesuque Water Quality Standards will be allowed within the boundaries of the Pueblo of Tesuque.

b. The operator shall provide a copy of the Notice of Intent (NOI) to the Pueblo of Tesuque Governor's Office in care of the Department of Environmental and Natural Resources (DENR) at the same time it is submitted to the Environmental

Protection Agency, for projects occurring within the boundaries of Tesuque tribal lands. The operator shall also notify the Pueblo of Tesuque Governor's Office in care of the DENR when it submits the Notice of Termination (NOT), but not before the DENR post-construction inspection has been completed as described below. The NOI and NOT shall be sent to the following address:

Pueblo of Tesuque
Office of the Governor
Attn: DENR
20 TP828 Administration Bldg.
Santa Fe, NM 87506-5512

Alternatively, the operator may arrange with DENR to email the documents.

c. The operator shall also provide a copy of the Stormwater Pollution Prevention Plan, copies of inspection reports, and copies of corrective action reports to the DENR.

d. Construction requiring this permit will not commence until the above document submissions have been made and DENR provides the operator with notice to proceed. Operators will not demobilize until DENR personnel inspect the site for complication of stabilization. Once the inspection has taken place and all SWPPP-related work has been completed to the satisfaction of DENR, the operator will submit its NOT as described above and then demobilize.

9.4.2.6 **Taos Pueblo**. The following conditions apply only to discharges on the Taos Pueblo Reservation:

a. The operator shall provide a copy of the Notice of Intent (NOI) to the Taos Pueblo Governor's Office, War Chief's Office and Environmental Office, at the same time it is submitted to the U.S. Environmental Protection Agency, for projects occurring within the exterior boundaries of Taos Pueblo. The operator shall also notify Taos Pueblo when it has submitted the Notice of Termination (NOT). The NOI and NOT shall be sent to the Taos Pueblo at the following addresses:

i. Taos Pueblo Governor's Office
P.O. Box 1846
Taos NM 87571

ii. Taos Pueblo War Chief's Office
P.O. Box 2596
Taos NM 87571

iii. Environmental Office
Attn: Program Manger
P.O. Box 1846
Taos NM 87571

b. Taos Pueblo requests that in the event Indian artifacts or human remains are inadvertently discovered on projects occurring near or on Taos Pueblo lands that consultation with the tribal Governor's Office occur at the earliest possible time.

c. The operator shall provide a copy of the Stormwater Pollution Prevention Plan, copies of inspections reports, and copies of corrective action reports to staff in the Taos Pueblo Environmental Office for review and copy, upon request.

9.4.2.7 Ohkay Owingeh. The following conditions apply only to discharges on the Ohkay Owingeh Reservation:

a. Prior to commencement of any construction activity on Ohkay Owingeh Lands requiring permit coverage under EPA's Construction General Permit, the operator(s) shall submit to Ohkay Owingeh Office of Environmental Affairs, a copy of the electronic "Notice of Intent," submitted to the Environmental Protection Agency, immediately following EPA's electronic notification that the NOI has been received. A copy of the Stormwater Pollution Prevention Plan(s) must be made available to the Ohkay Owingeh Office of Environmental Affairs upon the tribe's request either electronically or hard copy. Operator(s) shall also submit to Ohkay Owingeh Office of Environmental Affairs a copy of the electronic Notice of Termination (NOT) submitted to the Environmental Protection Agency. Documents shall be submitted to Ohkay Owingeh at the following address:

Ohkay Owingeh Office of Environment Affairs
Attention: Environmental Programs Manager
P.O. Box 717
Ohkay Owingeh, New Mexico 87566
Office # 505.852.4212
Fax # 505.852.1432
Electronic mail: naomi.archuleta@ohkay.org

b. Ohkay Owingeh will not allow the Rainfall Erosivity Waivers (see Appendix C) to be granted for any small construction activities.

c. All vegetation used to prevent soil loss, seeding or planting of the disturbed area(s) to meet the vegetative stabilization requirements must utilize native seeds/vegetation commonly known to the area. All temporary erosion control structures, such as silt fences must be removed as soon as stabilization requirements are met.

9.4.2.8 Pueblo of Laguna. The following conditions apply only to discharges on the Pueblo of Laguna Reservation:

a. The operator must provide a paper and electronic copy of the Notice of Intent (NOI) and Notice of Termination (NOT) to the Pueblo of Laguna at the same time it is provided to the U.S. Environmental Protection Agency. The NOI and NOT should be provided to the following address:

Pueblo of Laguna, Office of the Governor
Attn: Environmental & Natural Resources Department
P.O. Box 194
Laguna, NM 87026

Email: setter@pol-nsn.gov

b. The operator must provide an electronic copy of the Storm Water Pollution

Prevention Plan to the Pueblo of Laguna Environmental Program at the same time the NOI is submitted to the above listed email addresses. Any correspondences between the applicant and EPA related to analytical data, written reports, corrective action, enforcement, monitoring, or an adverse incident written reports threshold likewise be routed to the Pueblo of Laguna Environmental Program.

c. Immediate initiation of consultation with the Pueblo of Laguna is required should any human remains or artifacts be unearthed during the project that fall under the Native American Graves Protection and Repatriation Act guidelines. If human remains are unearthed, contact the Pueblo of Laguna Police Department at 505.552.6666. If artifacts are unearthed, contact the Pueblo of Laguna Tribal Historic Preservation Office at 505.552.5033.

9.4.2.9 Picuris Pueblo. The following conditions apply only to discharges on the Picuris Pueblo Reservation:

a. The operator, landowner and construction operators doing earth-disturbance work must meet the definition of "operator" under the Construction General Permit (CGP), and must provide an electronic and paper copy of the Notice of Intent (NOI) and Notice of Termination (NOT) to **both** The Office of the Picuris Pueblo Governor and the Picuris Pueblo Environmental Department at the same time it is provided to the U.S. Environmental Protection Agency (USEPA). The NOI and NOT should be provided to the following address:

Picuris Pueblo
The Office of the Governor
PO BOX 127
Penasco, NM 87553
575-587-2519
575-587-1071 (Fax)
Governor: governor@picurispueblo.org

Picuris Pueblo Environmental Department
PO BOX 158
Penasco, NM 87553
575-587-0110
575-587-0223 (Fax)
Environmental Director: environment@picurispueblo.org

b. The operator must provide an electronic copy of the Storm Water Pollution Prevention Plan to the Picuris Pueblo Environmental Department at least 30 days prior to submitting the NOI to USEPA and the Picuris Pueblo by email to Picuris Pueblo Environmental Department: environment@picurispueblo.org.

9.4.2.10 Pueblo of Pojoaque. The following conditions apply only to discharges on the Pueblo of Pojoaque Reservation:

a. The operator, landowner and construction operators doing earth-disturbance work must meet the definition of "operator" under the CGP and must provide a copy of the Notice of Intent (NOI) to the Pueblo of Pojoaque Governor's Office and Environmental Department within 3 days following U.S. Environmental Protection Agency's electronic confirmation that the NOI was certified and submitted and is undergoing its 14-day review period. Additionally, a copy of the Notice of Termination (NOT) must be provided the same day electronic confirmation is

received from the U.S. Environmental Protection Agency that the NOT has been accepted. The NOI and NOT should be provided to the following address:

Pueblo of Pojoaque
Office of the Governor
78 Cities of Gold Road
Santa Fe, NM 87506

Pueblo of Pojoaque
Environmental Department
39 Camino Del Rincon
Santa Fe, NM 87506

b. The operator must provide an electronic copy of the Stormwater Pollution Prevention Plans to the Pueblo of Pojoaque Environmental Department by email to Adam L Duran (aduran@pojoaque.org) at least 30 days prior to submitting the NOI to EPA and the Pueblo of Pojoaque.

9.4.2.11 Nambe Pueblo. The following conditions apply only to discharges on Nambe Pueblo:

a. The operator must provide a copy of the Notice of Intent (NOI) and Notice of Termination (NOT) to the Nambe Pueblo Governor's Office at the same time it is provided to the US Environmental Protection Agency. The NOI and NOT should be provided to the following address:

Office of the Governor
Nambe Pueblo
15A NP102 WEST
Nambe Pueblo, NM 87506

b. The operator must provide a copy of the Stormwater Pollution Prevention Plan to Nambe Pueblo at the same time it is submitted to the EPA, either by email to srydeen@nambepueblo.org or mailed to the above address.

9.4.3 OKR10I000 Indian country within the State of Oklahoma

9.4.3.1 Pawnee Nation. The following conditions apply only to discharges within Pawnee Indian country:

a. Copies of the Notice of Intent (NOI) and Notice of Termination (NOT) must be provided to the Pawnee Nation at the same time it is submitted to the Environmental Protection Agency to the following address:

Pawnee Nation Department of Environmental Conservation and Safety
P.O. Box 470
Pawnee, OK 74058
Or email to mmatlock@pawneenation.org

b. The Storm Water Pollution Prevention Plan must be available to Departmental inspectors upon request.

c. The Department must be notified at 918-762-3655 immediately upon discovery of any noncompliance with any provision of the permit conditions.

9.4.4 OKR10F000 Discharges in the State of Oklahoma that are not under the authority of the Oklahoma Department of Environmental Quality, including activities associated with oil and gas exploration, drilling, operations, and pipelines (includes SIC Groups 13 and 46, and SIC codes 492 and 5171), and point source discharges associated with agricultural production, services, and silviculture (includes SIC Groups 01, 02, 07, 08, 09).

a. For activities located within the watershed of any Oklahoma Scenic River, including the Illinois River, Flint Creek, Barren Fork Creek, Upper Mountain Fork, Little Lee Creek, and Lee Creek or any water or watershed designated "ORW" in Oklahoma's Water Quality Standards, this permit may only be used to authorize discharges from temporary construction activities. Certification is denied for any on-going activities such as sand and gravel mining or any other mineral mining.

b. For activities located within the watershed of any Oklahoma Scenic River, including the Illinois River, Flint Creek, Barren Fork Creek, Upper Mountain Fork, Little Lee Creek, and Lee Creek or any water or watershed designated "ORW" in Oklahoma's Water Quality Standards, certification is denied for any discharges originating from support activities, including concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, or borrow areas.

c. In order to company with Oklahoma's Water Quality Standards, these conditions and restrictions also apply to any construction projects located wholly or partially on Indian Country lands within the State of Oklahoma.

9.5 EPA Region 8

9.5.1 COR10I000 Indian country within the State of Colorado, as well as the portion of the Ute Mountain Reservation located in New Mexico.

9.5.1.1 The Ute Mountain Ute Tribe. The following conditions apply only to discharges on the Ute Mountain Ute Reservation.

a. Permittees must send the Stormwater Pollution Prevention Plan (SWPPP) to the Tribal Environmental Department for review and approval at least 30 days before construction starts.

b. Before submitting the Notice of Termination (NOT), permittees must clearly demonstrate to the Tribal Environmental Department during an on-site inspection that requirements for site stabilization have been met.

c. The permittee must send a copy of the Notice of Intent (NOI) and the Tribal Environmental Department.

d. Permittees may submit their SWPPPs and NOI and NOT requests electronically to: clarrick@utemountain.org.

e. Written NOIs, SWPPPs, and NOTs may be mailed to:

Colin Larrick, Water Quality Program Manager
Ute Mountain Ute Tribe
Environmental Department
P.O. Box 448
Towaoc, CO 81334

9.5.2 MTR10I000 Indian country within the State of Montana

9.5.2.1 The Confederated Salish and Kootenai Tribes of the Flathead Nation. The following conditions apply only to discharges on the Confederated Salish and Kootenai Tribes of the Flathead Nation Reservation:

a. Permittees must submit the Stormwater Pollution Prevention Plan (SWPPP) to the Confederated Salish and Kootenai Tribes at least 30 days before construction starts.

b. Before submitting the Notice of Termination (NOT), permittees must clearly demonstrate to an appointed Tribal staff person during an onsite inspection that requirements for site stabilization have been met.

c. The permittee must send a copy of the Notice of Intent (NOI) and the NOT to CSKT.

d. Permittees may submit their SWPPPs, NOIs and NOTs electronically to: clintf@cskt.org.

e. Written SWPPPs, NOIs and NOTs may be mailed to:

Clint Folden, Water Quality Regulatory Specialist
Confederated Salish and Kootenai Tribes
Natural Resources Department
P.O. Box 278
Pablo, MT 59855

9.6 EPA Region 9

9.6.1 AZR10I000 Indian Country within the state of Arizona, as well as Navajo Nation lands in New Mexico and Utah

9.6.1.1 Navajo Nation. The following conditions apply only to discharges on the Navajo Nation reservation:

a. Courtesy copies of Notice of Intents and stormwater pollution prevention plans shall be made available to Navajo EPA.

b. Copies of all monitoring reports must be provided to Navajo EPA.

c. Facilities covered under the CGP will be subject to compliance inspections by Navajo EPA staff with active Federal Inspector Credentials under the authority of the Clean Water Act.

d. Specific awareness and adherence to Sections 201 – Anti-degradation Policy, 203 – Narrative WQS, and 207.H - Turbidity.

9.6.2 CAR10I000 Indian country within the State of California

9.6.2.1 Twenty-Nine Palms Band of Mission Indians. The following conditions apply only to discharges on the Twenty-Nine Palms Band of Mission Indians Reservation:

a. At the time the applicant submits its Notice of Intent (NOI) to the EPA, the applicant must concurrently submit written notification of the NOI and a copy of the Stormwater Pollution Prevention Plan (SWPPP) to the Twenty-Nine Palms Band of Mission Indians at the address below:

Tribal Environmental Coordinator
Twenty-Nine Palms Band of Mission Indians
46-200 Harrison Place

Coachella, CA 92236

b. The applicant must also concurrently submit to the Tribal Environmental Coordinator written notification of any other forms or information submitted to the EPA, including waivers, reporting, and Notice of Termination (NOT).

c. Permitted entities under the CGP must keep the Tribal EPA informed of authorized discharges under the CGP by submitting written information about the type, quantity, frequency and location, intended purpose, and potential human health and/or environmental effects of their activities. These requirements are pursuant to Section 4 of the Twenty-Nine Palms Band of Mission Indians Water Pollution Control Ordinance (022405A). This information may be submitted to Tribal EPA in the form of Stormwater Pollution Prevention Plans (SWPPPs), monitoring reports, or other reports as required under the CGP. Spills, leaks, or unpermitted discharges must be reported in writing to Tribal EPA within 24 hours of the incident.

9.6.2.2 Morongo Band of Mission Indians. The following conditions apply only to discharges on the Morongo Band of Mission Indians Reservation:

a. This certification does not exempt, and is provisional upon compliance with, other applicable statutes and codes administered by federal and tribal agencies. Pursuant to the Morongo Band of Mission Indians Surface Water Quality Protection Ordinance (Ordinance 39), all unpermitted discharges must be reported to the Morongo Band of Mission Indians Environmental Protection Department (Morongo EPD) within 24 hours of the incident.

b. Each operator shall submit a signed hard copy of the Notice of Intent (NOI) and stormwater pollution prevention plan (SWPPP) to the Morongo EPD at the same time it is submitted electronically to the EPA.

c. The operator shall allow the Morongo EPD or its designee to inspect and sample at the construction site as needed.

Correspondence should be submitted to:

Morongo Band of Mission Indians
Environmental Protection Department
12700 Pumarra Road
Banning, CA 92220
Phone: (951) 755-5128
Email: epd@morongo-nsn.gov

9.6.3 GUR100000 Island of Guam. The following conditions apply only to discharges on the Island of Guam:

a. Any earth-moving operations which require a permit must be obtained from the Department of Public Works (DPW) with clearance approval from various Government of Guam Agencies including Guam EPA prior to the start of any earth-moving activity.

b. In the event that the construction sites are within the Guam Sole Source Aquifer, the construction site owner and operator must consider opportunities to facilitate groundwater recharge for construction and post-construction implementing infiltration Best Management Practices. Stormwater disposal systems shall be designed and operated within the boundaries of the project. Stormwater systems shall not be permitted within any Wellhead Protection Zone unless the discharge meets the Guam Water Quality Standards within the zone. Waters discharged

within the identified category G-2 recharge zone shall receive treatment to the degree required to protect the drinking water quality prior to it entering the category G-1 resource zone.

c. All conditions and requirements set forth in the 22 Guam Administrative Rules and Regulations (GARR), Division II, Water Control, Chapter 10, Guam Soil Erosion and Sediment Control Regulations (GSESCR) that are more protective than the CGP regarding construction activities must be complied with.

d. All standards and requirements set forth in the 22 GARR, Division II, Water Control, Chapter 5, *Guam Water Quality Standards (GWQS) 2001 Revisions*, must be complied with to include reporting GWQS exceedance to Guam EPA.

e. All operators/owners of any property development or earth moving activities shall comply with the erosion control pre-construction and post-construction BMP design performance standards and criteria set forth in the 2006 CNMI and Guam Stormwater Management Manual.

f. All conditions and requirements regarding dewatering activities set forth in 22 Guam Administrative Rules and Regulations Chapter 7, Water Resources Development and Operating Regulations must be complied with to include securing permits with Guam EPA prior to the start of any dewatering activities.

g. If a project to be developed is covered under the Federal Stormwater Regulations (40 CFR Parts 122 & 123), a Notice of Intent (NOI) to discharge stormwater to the surface and marine waters of Guam must be submitted to the U.S. EPA and a copy furnished to Guam EPA, pursuant to Section 10, 104(B)(5)(d) 22GAR, Division II, Chapter 10.

h. Guam EPA shall apply the Buffer Requirements listed in Appendix G of the CGP NPDES Permit for construction activities as it pertains to Waters of the U.S. in Guam. Guam EPA shall also apply the same buffer requirements for sinkholes in Guam.

i. When Guam EPA, through its permit review process, identifies that the proposed construction activity is close proximity to marine waters, contractors and owners will be informed that any activity that may impair water quality are required to stop during peak coral spawning periods as per the Guam Coral Spawning Construction Moratoriums.

j. The Proposed Construction General Permit must set appropriate measures and conditions to protect Guam's Threatened and Endangered Species and Outstanding Resource Waters of exceptional recreational or ecological significance as determined by the Guam EPA Administrator as per *Guam Water Quality Standards 2001 Revisions,* §5102, Categories of Waters, D. Outstanding Resource Waters.

k. When Guam EPA through its permit review process identifies that proposed construction activity is in close proximity to any Section 303d impaired waters, which includes marine waters and surface waters, shall ensure that construction activity does not increase the impaired water's ambient parameters.

l. When Rainfall Erosivity and TMDL Waivers reflected in the CGP, Appendix C, are submitted to the U.S. EPA, Guam EPA will review waivers on a project by project basis.

m. Prior to submission of the Notice of Termination (NOT) to the U.S. EPA, permittees must clearly demonstration to Guam EPA that the project site has met all soil

stabilization requirements and removal of any temporary erosion control as outlined in the GSESCR.

9.7 EPA Region 10

9.7.1 IDR100000 State of Idaho, except Indian country

a. *Idaho's Antidegradation Policy*. The WQS contain an antidegradation policy providing three levels of protection to water bodies in Idaho (IDAPA 58.01.02.051).

1. Tier I Protection. The first level of protection applies to all water bodies subject to Clean Water Act jurisdiction and ensures that existing uses of a water body and the level of water quality necessary to protect those existing uses will be maintained and protected (IDAPA 58.01.02.051.01; 58.01.02.052.01). Additionally, a Tier 1 review is performed for all new or reissued permits or licenses (IDAPA 58.01.02.052.05).
2. Tier II Protection. The second level of protection applies to those water bodies considered high quality and ensures that no lowering of water quality will be allowed unless deemed necessary to accommodate important economic or social development (IDAPA 58.01.02.051.02; 58.01.02.052.08).
3. Tier III Protection. The third level of protection applies to water bodies that have been designated outstanding resource waters and requires that activities not cause a lowering of water quality (IDAPA 58.01.02.051.03; 58.01.02.052.09).

DEQ is employing a water body by water body approach to implementing Idaho's antidegradation policy. This approach means that any water body fully supporting its beneficial uses will be considered high quality (IDAPA 58.01.02.052.05.a). Any water body not fully supporting its beneficial uses will be provided Tier I protection for that use, unless specific circumstances warranting Tier II protection are met (IDAPA 58.01.02.052.05.c). The most recent federally approved Integrated Report and supporting data are used to determine support status and the tier of protection (IDAPA 58.01.02.052.05).

b. *Pollutants of Concern.* The primary pollutants of concern associated with stormwater discharges from construction activities are sediment, typically measured as total suspended solids and turbidity. Other potential pollutants include the following: phosphorus, nitrogen, pesticides, organics, metals, PCBs, petroleum products, construction chemicals, and solid wastes.

c. *Receiving Water Body Level of Protection.* The CGP provides coverage to construction activities throughout the entire State of Idaho. Because of the statewide applicability, all of the jurisdictional waters within Idaho could potentially receive discharges either directly or indirectly from activities covered under the CGP. DEQ applies a water body by water body approach to determine the level of antidegradation a water body will receive.

All waters in Idaho that receive discharges from activities authorized under the CGP will receive, at minimum Tier I antidegradation protection because Idaho's antidegradation policy applies to all waters of the state. Water bodies that fully support their aquatic life or recreational uses are considered to be *high quality waters* and will receive Tier II antidegradation protection.

Although Idaho does not currently have any Tier III designated outstanding resource waters (ORWs) designated, it is possible for a water body to be designated as an ORW during the life of the CGP. Because of this potential, the antidegradation review also assesses whether the permit complies with the

outstanding resource water requirements of Idaho's antidegradation policy.

To determine the support status of the receiving water body, persons filing a Notice of Intent (NOI) for coverage under this general permit must use the most recent EPA-approved Integrated Report, available on Idaho DEQ's website: http://www.deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report/.

High quality waters are identified in Categories 1 and 2 of the Integrated Report. If a water body is in either Category 1 or 2, it is a Tier II water body.

Unassessed waters are identified as Category 3 of DEQ's Integrated Report. These waters require a case-by-case determination to be made by DEQ based on available information at the time of the application for permit coverage. If a water body is unassessed, the applicant is directed to contact DEQ for assistance in filing the NOI.

Impaired waters are identified in Categories 4 and 5 of the Integrated Report. Category 4(a) contains impaired waters for which a TMDL has been approved by EPA. Category 4(b) contains impaired waters for which controls other than a TMDL have been approved by EPA. Category 5 contains waters which have been identified as "impaired," for which a TMDL is needed. These waters are Tier I waters, for the use which is impaired. With the exception, if the aquatic life uses are impaired for any of these three pollutants—dissolved oxygen, pH, or temperature—and the biological or aquatic habitat parameters show a health, balanced biological community, then the water body shall receive Tier II protection, in addition to Tier I protection, for aquatic life uses (IDAPA 58.01.02.052.05.c.i.).

DEQ's webpage also has a link to the state's map-based Integrated Report which presents information from the Integrated Report in a searchable, map-based format: http://www.deq.idaho.gov/assistance-resources/maps-data/.

Water bodies can be in multiple categories for different causes. If assistance is needed in using these tools, or if additional information/clarification regarding the support status of the receiving water body is desired, the operator is directed to make contact with the appropriate DEQ regional office of the State office in the table below:

Regional and State Office	**Address**	**Phone Number**	**Email**
Boise	1445 N. Orchard Rd., Boise 83706	208-373-0550	Kati.carberry@deq.idaho.gov
Coeur d'Alene	2110 Ironwood Parkway, Coeur D'Alene 83814	208-769-1422	June.bergquist@deq.idaho.gov
Idaho Falls	900 N. Skyline, Suite B., Idaho Falls 83402	208-528-2650	Troy.saffle@deq.idaho.gov

Lewiston	1118 "F" St., Lewiston 83501	208-799-4370	Mark.sellet@deq.idaho.gov
Pocatello	444 Hospital way, #300 Pocatello 83201	208-236-6160	Lynn.vanevery@deq.idaho.gov
Twin Falls	650 Addison Ave., W., Suite 110, Twin Falls 83301	208-736-2190	Balthasar.buhidar@deq.idaho.gov
State Office	1410 N. Hilton Rd., Boise 83706	208-373-0502	Nicole.deinarowicz@deq.idaho.gov

d. *Turbidity Monitoring.* The permittee must conduct turbidity monitoring during construction activities and thereafter on days where there is a direct discharge of pollutants from an unstabilized portion of the site which is causing a visible plume to a water of the U.S.

A properly and regularly calibrated turbidimeter is required for measurements analyzed in the field (preferred method), but grab samples may be collected and taken to a laboratory for analysis. If the permittee can demonstrate that there will be no direct discharge from the construction site, then turbidity monitoring is not required. When monitoring is required, a sample must be taken at an undisturbed area immediately upstream of the project area to establish background turbidity levels for the monitoring event. Background turbidity, location, date and time must be recorded prior to monitoring downstream of the project area. A sample must also be taken immediately downstream from any point of discharge and *within* any visible plume. The turbidity, location, date and time must be recorded. The downstream sample must be taken immediately following the upstream sample in order to obtain meaningful and representative results.

Results from the compliance point sampling or observation[78] must be compared to the background levels to determine whether project activities are causing an exceedance of state WQS. If the downstream turbidity is 50 NTUs or more than the upstream turbidity, then the project is causing an exceedance of WQS. *Any exceedance of the turbidity standard must be reporting to the appropriate DEQ regional office within 24 hours. The following six (6) steps should be followed to ensure compliance with the turbidity standard:*

1. If a visible plume is observed, quantify the plume by collecting turbidity measurements from within the plume and compare the results to Idaho's instantaneous numeric turbidity criterion (50 NTU over the background).

[78] A visual observation is only acceptable to determine whether BMPs are functioning properly. If a plume is observed, the project may be causing an exceedance of WQS and the permittee must collect turbidity data and inspect the condition of the projects BMPs. If the BMPs appear to be functioning to their fullest capability and the turbidity is 50 NTUs or more than the upstream turbidity, then the permittee must modify the activity or implement additional BMPs (this may also include modifying existing BMPs).

2. If turbidity is less than 50 NTU instantaneously over the background turbidity; continue monitoring as long as the plume is visible. If turbidity exceeds background turbidity by more than 50 NTU instantaneously then stop all earth disturbing construction activities and proceed to step 3.
3. Take immediate action to address the cause of the exceedance. That may include inspection the condition of project BMPs. If the BMPs are functioning to their fullest capability, then the permittee must modify project activities and/or BMPs to correct the exceedance.
4. Notify the appropriate DEQ regional office within 24 hours.
5. Possibly increase monitoring frequency until state water quality standards are met.
6. Continue earth disturbing construction activities once turbidity readings return to within 50 NTU instantaneously and 25 NTU for more than ten consecutive days over the background turbidity.

Copies of daily logs for turbidity monitoring must be available to DEQ upon request. The report must describe all exceedances and subsequent actions taken, including the effectiveness of the action.

e. *Reporting of Discharges Containing Hazardous Materials or Petroleum Products.* All spills of hazardous material, deleterious material or petroleum products which may impact waters (ground and surface) of the state shall be immediately reported. Call 911 if immediate assistance is required to control, contain or clean up the spill. If no assistance is needed in cleaning up the spill, contact the appropriate DEQ regional office in the table below during normal working hours or Idaho State Communications Center after normal working hours. If the spilled volume is above federal reportable quantities, contact the National Repose Center.

For immediate assistance: Call 911

National Response Center: (800) 424-8802

Idaho State Communications Center: (208) 632-8000

Regional office	Toll Free Phone Number	Phone Number
Boise	888-800-3480	208-373-0321
Coeur d'Alene	877-370-0017	208-769-1422
Idaho Falls	800-232-4635	208-528-2650
Lewiston	977-547-3304	208-799-4370
Pocatello	888-655-6160	208-236-6160
Twin Falls	800-270-1663	208-736-2190

9.7.2 IDR10I000 Indian country within the State of Idaho, except Duck Valley Reservation lands (see Region 9)

9.7.2.1 Shoshone-Bannock Tribes. The following conditions apply only to discharges on the Shoshone-Bannock Reservation:

f. Each operator shall submit a signed hard copy of the Notice of Intent (NOI) to the Shoshone-Bannock Tribes Water Resources Department at the same time it is

submitted electronically to the Environmental Protection Agency (EPA) and shall provide the Shoshone-Bannock Tribes Water Resources Department the acknowledgement of receipt of the NOI from the EPA within 7 calendar days of receipt from the EPA.

9.7.3 WAR10F000 Areas in the State of Washington, except those located on Indian country, subject to construction activity by a Federal Operator. The following conditions apply only to discharges on federal facilities in the State of Washington:

a. Discharges shall not cause or contribute to a violation of surface water quality standards (Chapter 173-201A WAC), groundwater quality standards (Chapter 173-200 WAC), sediment management standards (Chapter 173-204 WAC), and human health-based criteria in the National Toxics Rule (40 CFR Part 131.36). Discharges that are not in compliance with these standards are not authorized.

b. Prior to the discharge of stormwater and non-storm water to waters of the State, the Permittee must apply all known, available, and reasonable methods of prevention, control, and treatment (AKART). This includes the preparation and implementation of an adequate SWPPP, with all appropriate BMPs installed and maintained in accordance with the SWPPP and the terms and conditions of this permit.

c. Permittees who discharge to segments of waterbodies listed as impaired by the State of Washington under Section 303(d) of the Clean Water Act for turbidity, fine sediment, phosphorus, or pH must comply with the following numeric effluent limits:

Parameter Identified in 303{d) Listing	Parameter Sampled	Unit	Analytical Method	Numeric Effluent Limit
• Turbidity • Fine Sediment • Phosphorus	Turbidity	NTU	SM2130 or EPA 180.1	25 NTUs at the point where the stormwater is discharged from the site.
High pH	pH	Su	pH meter	In the range of 6.5 – 8.5

d. All references and requirements associated with Section 303(d) of the Clean Water Act mean the most current EPA approved listing of impaired waters that exists on February 16, 2017, or the date when the operator's complete permit application is received by EPA, whichever is later.

e. Discharges to waterbodies subject to an applicable Total Maximum Daily Load (TMDL) for turbidity, fine sediment, high pH, or phosphorus, shall be consistent with the assumptions and requirements of the TMDL.

   i. Where an applicable TMDL sets specific waste load allocations or requirements for discharges covered by this permit, discharges shall be consistent with any specific waste load allocations or requirements establish by the applicable TMDL.

   ii. Where an applicable TMDL has established a general waste load allocation for construction stormwater discharges, but no specific requirements have been identified, compliance with this permit will be assumed to be consistent with the approved TMDL.

iii. Where an applicable TMDL has not specified a waste load allocation for construction stormwater discharges, but has not excluded these discharges, compliance with this permit will be assumed to be consistent with the approved TMDL.

iv. Where an applicable TMDL specifically precludes or prohibits discharges from construction activity, the operator is not eligible for coverage under this permit.

v. Applicable TMDL means a TMDL for turbidity, fine sediment, high pH, or phosphorus, which has been completed and approved by EPA prior to February 16, 2017, or prior to the date the operator's complete NOI is received by EPA, whichever is later.

9.7.4 WAR10I000 Indian country within the State of Washington

9.7.4.1 Confederated Tribes of the Colville Reservation. The following conditions apply only to discharges on the Colville Indian Reservation (CIR) and on other Tribal trust lands or allotments of the Confederated Tribes of the Colville Reservation:

a. A copy of the Stormwater Pollution Prevention Plan must be submitted to the following office at least thirty (30) days in advance of sending the Notice of Intent (NOI) to EPA:

Environmental Trust Department
Confederated Tribes of the Colville Reservation
PO Box 150
Nesepelem, WA 99155

b. Copies of the Notice of Intent (NOI) and Notice of Termination (NOT) must be sent to the ETD at the same time they are submitted to EPA.

c. Discharges to Omak Creek, the Okanogan River, and Columbia River downstream of Chief Joseph Dam may affect threatened or endangered species, and shall only be permitted in adherence with Appendix D of the CGP.

d. All work shall be carried out in such a manner as will prevent violations of water quality criteria as stated in Chapter 4-8 Water Quality Standards of the Colville Law and Order Code, as amended.

e. Appropriate steps shall be taken to ensure that petroleum products or other chemical pollutants are prevented from entering waters of the CIR. All spills must be reported to the appropriate emergency management agency and the ETD, and measures shall be taken immediately to prevent the pollution of waters of the CIR, including groundwater.

f. Stormwater site inspections shall be conducted at least once every 7 calendar days, within 24-hours of the occurrence of a rain event of 0.25 inches or greater in a 24-hour period, and daily during periods of saturated ground surface or snowmelt with accompanying surface runoff.

g. Results of discharge sampling must be reported to the ETD within 7 days of sample collection. All sample reporting must include the date and time, location, and individual performing the sampling.

h. Any corrective action reports that are required under the CGP must be submitted to the ETD at the above address within one (1) working day of the report completion.

i. This certification does not authorize impacts to cultural, historical, or archeological features or sites, or proprieties that may be eligible for such listing.

9.7.4.2 Lummi Nation. The following conditions apply only to discharges on the Lummi Reservation:

a. The Lummi Nation reserves the right to modify this 401 certification if the final version of the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (CGP) on tribal lands in the State of Washington (Permit No. WAR10I000) is substantively different than the draft version of the proposed permit that was made available for public comments during April 2016. The Lummi Nation will determine if the final version of the NPDES CGP is substantively different than the draft version following review of the final version once the EPA makes it available.

b. This certification does not exempt and is provisional upon compliance with other applicable statutes and codes administered by federal and Lummi tribal agencies. Pursuant to Lummi Code of Laws (LCL) 17.05.020(a), the operator must also obtain a land use permit from the Lummi Planning Department as provided in Title 15 of the Lummi Code of Laws and regulations adopted thereunder.

c. Pursuant to LCL 17.05.020(a), each operator shall develop and submit a Storm Water Pollution Prevention Plan to the Lummi Water Resources Division for review and approval by the Water Resources Manager prior to beginning any discharge activities.

d. Pursuant to LCL Title 17, each operator shall be responsible for achieving compliance with the Water Quality Standards for Surface Waters of the Lummi Indian Reservation (Lummi Administrative Regulations [LAR] 17 LAR 07.010 through 17 LAR 07.210 together with supplements and amendments thereto).

e. Each operator shall submit a signed hard copy of the Notice of Intent (NOI) to the Lummi Water Resources Division at the same time it is submitted electronically to the Environmental Protection Agency (EPA) and shall provide the Lummi Water Resources Division the acknowledgement of receipt of the NOI from the EPA and the associated NPDES tracking number provided by the EPA within 7 calendar days of receipt from the EPA.

f. Each operator shall submit a signed hard copy of the Notice of Termination (NOT) to the Lummi Water Resources Division at the same time it is submitted electronically to the EPA and shall provide the Lummi Water Resources Division the EPA acknowledgement of receipt of the NOT.

g. Storm Water Pollution Prevention Plans, Notice of Intent, Notice of Termination and associated correspondence with the EPA shall be submitted to:

Lummi Natural Resources Department
ATTN: Water Resources Manager
2665 Kwina Road
Bellingham, WA 98226-9298

9.7.4.3 Makah Tribe. The following conditions apply only to discharges on the Makah Reservation:

a. The operator shall be responsible for achieving compliance with the Makah Tribe's Water Quality Standards.

b. The operator shall submit a Storm Water Pollution Prevention Plan to the Makah Tribe Water Quality Program and Makah Fisheries Habitat Division for review and approval at least thirty (30) days prior to beginning any discharge activities.

c. The operator shall submit a copy of the Notice of Intent to the Makah Tribe Water Quality Program and Makah Fisheries Habitat Division at the same time it is submitted to EPA.

d. Storm Water Pollution Prevention Plans and Notices of Intent shall be submitted to:

Aaron Parker
Makah Fisheries Management Water Quality Specialist
(360) 645-3162
Cell 206-356-0319
Aaron.parker@makah.com
PO Box 115
Neah Bay WA 98357

9.7.4.4 Puyallup Tribe of Indians. The following conditions apply only to discharges on the Puyallup Tribe of Indians Reservation:

a. Each permittee shall be responsible for achieving compliance with the Puyallup Tribe's Water Quality Standards, including antidegradation provisions. The Puyallup Natural Resources Department will conduct an antidegradation review for permitted activities that have the potential to lower water quality. The antidegradation review will be consistent with the Tribe's Antidegradation Implementation Procedures. The Tribe may also impose additional controls on a site-specific basis, or request EPA to require the operator obtain coverage under an individual permit, if information in the NOI or from other sources indicates that the operator's discharges are not controlled as necessary to meet applicable water quality standards.

b. The permittee shall be responsible for meeting any additional permit requirements imposed by EPA necessary to comply with the Puyallup Tribe's antidegradation policies if the discharge point is located within 1 linear mile upstream of waters designated by the Tribe.

c. Each permittee shall submit a copy of the Notice of Intent (NOI) to be covered by the general permit to Char Naylor (char.naylor@puyalluptribe.com) and Russ Ladley (russ.ladley@puyalluptribe.com) by email or at the address listed below at the same time it is submitted to EPA.

Puyallup Tribe of Indians
3009 E. Portland Avenue
Tacoma, WA 98404
ATTN: Russ Ladley and Char Naylor

d. All supporting documentation and certifications in the NOI related to coverage under the general permit for Endangered Species Act purposes shall be submitted to the Tribe's Resource Protection Manager (russ.ladley@puyalluptribe.com) and Char Naylor (char.naylor@puyalluptribe.com) for review.

e. If EPA requires coverage under an individual or alternative permit, the permittee shall submit a copy of the permit to Russ Ladley and Char Naylor at the address listed above.

f. The permittee shall submit all stormwater pollution prevention plans to Char Naylor for review and approval prior to beginning any activities resulting in a discharge to tribal waters.

g. The permittee shall conduct benchmark monitoring for turbidity (or transparency) and, in the event of significant concrete work or engineered soils, pH monitoring as well. Monitoring, benchmarks, and reporting requirements contained in Condition S.4. (pp.13-20) of the Washington State Construction Stormwater General Permit, effective January 1, 2016, shall apply, as applicable.

h. The permittee shall notify Char Naylor (253-680-5520) and Russ Ladley (253-680-5560) prior to conducting inspections at construction sites generating storm water discharged to tribal waters.

i. Treat dewatering discharges with controls necessary to minimize discharges of pollutants in order to minimize the discharge of pollutants to groundwater or surface waters from stormwater that is removed from excavations, trenches, foundations, vaults, or other storage areas. Examples of appropriate controls include sediment basins or sediment traps, sediment socks, dewatering tanks, tube settlers, weir tanks, and filtration systems (e.g., bag or sand filters) that are designed to remove sediment.

   To the extent feasible, utilize vegetated, upland areas of the site to infiltrate dewatering water before discharge. At all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 2.2.11 of EPA's 2016 General Construction Stormwater Permit. Examples of velocity dissipation devices include check dams, sediment traps, riprap, and grouted riprap at outlets.

j. The permittee shall provide and maintain natural buffers to the maximum extent possible (and/or equivalent erosion and sediment controls) when tribal waters are located within 100 feet of the site's earth disturbances. If infeasible to provide and maintain an undisturbed 100 foot natural buffer, erosion and sediment controls to achieve the sediment load reduction equivalent to a 100-foot undisturbed natural buffer shall be required.

9.7.4.5 Spokane Tribe of Indians. The following conditions apply only to discharges on the Spokane Tribe Reservation:

a. Pursuant to Tribal Law and Order Code (TLOC) Chapter 30 each operator shall be responsible for achieving compliance with the Surface Water Quality Standards of the Spokane Tribe. The operator shall notify the Spokane Tribe, Water Control Board (WCB) of any spills of hazardous material and;

b. Each operator shall submit a signed hard copy of the Notice of Intent (NOI) to the WCB at the same time it is submitted to EPA.

c. The permittee shall allow the Tribal Water Control Board or its designee to inspect and sample at the construction site as needed.

d. Each operator shall submit a signed copy of the Notice of Termination (NOT) to the WCB at the same time it is submitted to EPA.

   The correspondence address for the Spokane Tribe Water Control Board is:

   Water Control Board
   c/o. Brian Crossley
   P0 Box 480
   Wellpinit WA 99040

(509)626-4409
crossley@spokanetribe.com

9.7.4.6 Swinomish Indian Tribal Community. The following conditions apply only to discharges on the Swinomish Reservation:

a. Owners and operators seeking coverage under this permit who intend to discharge to Regulated Surface Waters must submit a copy of the Notice of Intent (NOI) to the DEP at the same time the NOI is submitted to EPA.

b. Owners and operators seeking coverage under this permit must also submit a Stormwater Pollution Prevention Plan to the DEP for review and approval by DEP prior to beginning any discharge activities.

c. Owners and operators must also submit to the DEP Changes in NOI and/or Notices of Termination at the same time they are submitted to EPA.

9.7.4.7 Tulalip Tribes. The following conditions apply only to discharges on the Tulalip Reservation:

a. This certification does not exempt and is provisional upon compliance with other applicable statues and codes administered by federal and Tulalip tribal agencies. Pursuant to Tulalip Tribes code of law, the operator must also obtain a land use permit from the Tulalip Tribes Planning Department as provided in Title 7 of the Tulalip Tribal Code (http://www.codepublishing.com/WA/Tulalip/?Tulalip02/Tulalip0205.html).

b. Each CGP operator shall be responsible for achieving compliance with Tulalip Tribes Water Quality Standards.

c. Each CGP operator shall submit their Stormwater Pollution Prevention Plan (SWPPP) to the:

Tulalip Natural & Cultural Resources Department
Tulalip Tribes
6406 Marine Drive
Tulalip, WA 98271

Appendix A - Definitions and Acronyms

1. Definitions

"Action Area" – all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. See 50 CFR 402. For the purposes of this permit and for application of the threatened and endangered species protection eligibility requirements, the following areas are included in the definition of action area:

- The areas on the construction site where stormwater discharges originate and flow toward the point of discharge into the receiving waters (including areas where excavation, site development, or other ground disturbance activities occur) and the immediate vicinity. (Example: Where bald eagles nest in a tree that is on or bordering a construction site and could be disturbed by the construction activity or where grading causes stormwater to flow into a small wetland or other habitat that is on the site that contains listed species.)
- The areas where stormwater discharges flow from the construction site to the point of discharge into receiving waters. (Example: Where stormwater flows into a ditch, swale, or gully that leads to receiving waters and where listed species (such as listed amphibians) are found in the ditch, swale, or gully.)
- The areas where stormwater from construction activities discharges into receiving waters and the areas in the immediate vicinity of the point of discharge. (Example: Where stormwater from construction activities discharges into a stream segment that is known to harbor listed aquatic species.)
- The areas where stormwater controls will be constructed and operated, including any areas where stormwater flows to and from the stormwater controls. (Example: Where a stormwater retention pond would be built.)
- The areas upstream and/or downstream from the stormwater discharge into a stream segment that may be affected by these discharges. (Example: Where sediment discharged to a receiving stream settles downstream and impacts a breeding area of a listed aquatic species.)

"Agricultural Land" - cropland, grassland, rangeland, pasture, and other agricultural land, on which agricultural and forest-related products or livestock are produced and resource concerns may be addressed. Agricultural lands include cropped woodland, marshes, incidental areas included in the agricultural operation, and other types of agricultural land used for the production of livestock.

"Antidegradation Policy" or "Antidegradation Requirements" - the water quality standards regulation that requires states and tribes to establish a three-tiered antidegradation program:

1. Tier 1 maintains and protects existing uses and water quality conditions necessary to support such uses. An existing use can be established by demonstrating that fishing, swimming, or other uses have actually occurred since November 28, 1975, or that the water quality is suitable to allow such uses to occur. Where an existing use is established, it must be protected even if it is not listed in the water quality standards as a designated use. Tier 1 requirements are applicable to all surface waters.
2. Tier 2 maintains and protects "high quality" waters -- waterbodies where existing conditions are better than necessary to support CWA § 101(a)(2) "fishable/swimmable" uses. Water quality can be lowered in such waters. However, state and tribal Tier 2 programs identify procedures that must be followed and questions that must be

answered before a reduction in water quality can be allowed. In no case may water quality be lowered to a level which would interfere with existing or designated uses.

3. Tier 3 maintains and protects water quality in outstanding national resource waters (ONRWs). Except for certain temporary changes, water quality cannot be lowered in such waters. ONRWs generally include the highest quality waters of the United States. However, the ONRW classification also offers special protection for waters of exceptional ecological significance, i.e., those which are important, unique, or sensitive ecologically. Decisions regarding which water bodies qualify to be ONRWs are made by states and authorized Indian tribes.

"Arid Areas" – areas with an average annual rainfall of 0 to 10 inches.

"Bank" (e.g., stream bank or river bank) – the rising ground bordering the channel of a water of the U.S.

"Bluff" – a steep headland, promontory, riverbank, or cliff.

"Borrow Areas" – the areas where materials are dug for use as fill, either onsite or off-site.

"Business day" – for the purposes of this permit, a business day is a calendar day on which construction activities will take place.

"Bypass" – the intentional diversion of waste streams from any portion of a treatment facility. See 40 CFR 122.41(m)(1)(i).

"Cationic Treatment Chemical" – polymers, flocculants, or other chemicals that contain an overall positive charge. Among other things, they are used to reduce turbidity in stormwater discharges by chemically bonding to the overall negative charge of suspended silts and other soil materials and causing them to bind together and settle out. Common examples of cationic treatment chemicals are chitosan and cationic PAM.

"Commencement of Construction Activities" – the initial disturbance of soils (or 'breaking ground') associated with clearing, grading, or excavating activities or other construction-related activities (e.g., stockpiling of fill material; placement of raw materials at the site).

"Common Plan of Development or Sale" – A contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one common plan. The "common plan" of development or sale is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, permit application, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating construction activities may occur on a specific plot.

"Construction Activities" – earth-disturbing activities, such as the clearing, grading, and excavation of land, and other construction-related activities (e.g., stockpiling of fill material; placement of raw materials at the site) that could lead to the generation of pollutants. Some of the types of pollutants that are typically found at construction sites are:

- sediment;
- nutrients;
- heavy metals;
- pesticides and herbicides;
- oil and grease;
- bacteria and viruses;
- trash, debris, and solids;

- treatment polymers; and
- any other toxic chemicals.

"Construction and Development Effluent Limitations and New Source Performance Standards" (C&D Rule) – as published in 40 CFR § 450, the regulation requiring effluent limitations guidelines (ELGs) and new source performance standards (NSPS) for controlling the discharge of pollutants from construction sites.

"Construction Site" or "Site" – the land or water area where construction activities will occur and where stormwater controls will be installed and maintained. The construction site includes construction support activities, which may be located at a different part of the property from where the primary construction activity will take place, or on a different piece of property altogether.

"Construction Support Activity" – a construction-related activity that specifically supports the construction activity and involves earth disturbance or pollutant-generating activities of its own, and can include activities associated with concrete or asphalt batch plants, equipment staging yards, materials storage areas, excavated material disposal areas, and borrow areas.

"Construction Waste" – discarded material (such as packaging materials; scrap construction materials; masonry products; timber, steel, pipe, and electrical cuttings; plastics; and styrofoam).

"Conveyance Channel" – a temporary or permanent waterway designed and installed to safely convey stormwater flow within and out of a construction site.

"Critical Habitat" – as defined in the Endangered Species Act at 16 U.S.C. 1531 for a threatened or endangered species, (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act, on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act, upon a determination by the Secretary that such areas are essential for the conservation of the species.

"CWA" – the Clean Water Act or the Federal Water Pollution Control Act, 33 U.S.C. section 1251 et seq.

"Dewatering" – the act of draining rainwater and/or ground water from building foundations, vaults, and trenches.

"Discharge" – when used without qualification, means the "discharge of a pollutant."

"Discharge of a Pollutant" – any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source," or any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation. This includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. See 40 CFR 122.2.

"Discharge Point" – for the purposes of this permit, the location where collected and concentrated stormwater flows are discharged from the construction site.

"Discharge-Related Activity" – activities that cause, contribute to, or result in stormwater and allowable non-stormwater point source discharges, and measures such as the siting, construction, and operation of stormwater controls to control, reduce, or prevent pollutants from being discharged.

"Discharge to an Impaired Water" – for the purposes of this permit, a discharge to an impaired water occurs if the first water of the U.S. to which you discharge is identified by a state, tribe, or EPA pursuant to Section 303(d) of the Clean Water Act as not meeting an applicable water quality standard and (1) requires development of a total maximum daily load (TMDL) (pursuant to section 303(d) of the CWA; or (2) is addressed by an EPA-approved or established TMDL; or (3) is not in either of the above categories but the waterbody is covered by a pollution control program that meets the requirements of 40 CFR 130.7(b)(1). For discharges that enter a storm sewer system prior to discharge, the water of the U.S. to which you discharge is the first water of the U.S. that receives the stormwater discharge from the storm sewer system.

"Domestic Waste" – for the purposes of this permit, typical household trash, garbage or rubbish items generated by construction activities.

"Drainageway" – an open linear depression, whether constructed or natural, that functions for the collection and drainage of surface water.

"Drought-Stricken Area" – for the purposes of this permit, an area in which the National Oceanic and Atomospheric Administration's U.S. Seasonal Drought Outlook indicates for the period during which the construction will occur that any of the following conditions are likely: (1) "Drought to persist or intensify", (2) "Drought ongoing, some improvement", (3) "Drought likely to improve, impacts ease", or (4) "Drought development likely". See http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php.

"Earth-Disturbing Activity"– actions taken to alter the existing vegetation and/or underlying soil of a site, such as clearing, grading, site preparation (e.g., excavating, cutting, and filling), soil compaction, and movement and stockpiling of top soils.

"Earth-Disturbing Activities Conducted Prior to Active Mining Activities" – Consists of two classes of earth-disturbing (i.e., clearing, grading and excavation) activities:

a. activities performed for purposes of mine site preparation, including: cutting new rights of way (except when related to access road construction); providing access to a mine site for vehicles and equipment (except when related to access road construction); other earth disturbances associated with site preparation activities on any areas where active mining activities have not yet commenced (e.g., for heap leach pads, waste rock facilities, tailings impoundments, wastewater treatment plants); and

b. construction of staging areas to prepare for erecting structures such as to house project personnel and equipment, mill buildings, etc., and construction of access roads.

Note: only earth-disturbing activities associated with the construction of staging areas and the construction of access roads conducted prior to active mining (see (b) above) are considered to be "construction" and therefore stormwater discharges from these activities are eligible for coverage under this permit. See Part 1.2.1.b. The activities described in (a) above are not considered to be "construction" and therefore stormwater discharges associated with this activity are not eligible for coverage under this permit.

"Effective Operating Condition" – for the purposes of this permit, a stormwater control is kept in effective operating condition if it has been implemented and maintained in such a manner that it is working as designed to minimize pollutant discharges.

"Effluent Limitations" – for the purposes of this permit, any of the Part 2 or Part 3 requirements.

"Effluent Limitations Guideline" (ELG) – defined in 40 CFR § 122.2 as a regulation published by the Administrator under section 304(b) of the CWA to adopt or revise effluent limitations.

"Eligible" – for the purposes of this permit, refers to stormwater and allowable non-stormwater discharges that are authorized for coverage under this general permit.

"Emergency-Related Project" – a project initiated in response to a public emergency (e.g., mud slides, earthquake, extreme flooding conditions, disruption in essential public services), for which the related work requires immediate authorization to avoid imminent endangerment to human health or the environment, or to reestablish essential public services.

"Endangered Species" – defined in the Endangered Species Act at 16 U.S.C. 1531 as any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man.

"Excursion" – a measured value that exceeds a specified limit.

"Existing Site" – a site where construction activities commenced prior to February 16, 2017.

"Exit Points" – any points of egress from the construction site to be used by vehicles and equipment during construction activities.

"Exposed Soils" – for the purposes of this permit, soils that as a result of earth-disturbing activities are left open to the elements.

"Federal Operator" – an entity that meets the definition of "Operator" in this permit and is either any department, agency or instrumentality of the executive, legislative, and judicial branches of the Federal government of the United States, or another entity, such as a private contractor, performing construction activity for any such department, agency, or instrumentality.

"Final Stabilization" – on areas not covered by permanent structures, either (1) uniform, perennial vegetation *(e.g., evenly distributed, without large bare areas)* has been established, or for arid or semi-arid areas, will be established that provides 70 percent or more of the cover that is provided by vegetation native to local undisturbed areas, and/or (2) permanent non-vegetative stabilization measures (e.g., riprap, gravel, gabions, and geotextiles) have been implemented to provide effective cover for exposed portions of the site

"General Contractor" – for the purposes of this permit, the primary individual or company solely accountable to perform a contract. The general contractor typically supervises activities, coordinates the use of subcontractors, and is authorized to direct workers at a site to carry out activities required by the permit.

"Hazardous Substances" or "Hazardous or Toxic Waste" – for the purposes of this permit, any liquid, solid, or contained gas that contain properties that are dangerous or potentially harmful to human health or the environment. See also 40 CFR §261.2.

"Historic Property" – as defined in the National Historic Preservation Act regulations, means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

"Impaired Water"– a water identified by the state, tribe, or EPA as not meeting an applicable water quality standard and (1) requires development of a TMDL (pursuant to section 303(d) of the CWA; or (2) is addressed by an EPA-approved or established TMDL; or (3) is not in either of the above categories but the waterbody is covered by a pollution control program that meets the requirements of 40 CFR 130.7(b)(1).

"Impervious Surface" – for the purpose of this permit, any land surface with a low or no capacity for soil infiltration including, but not limited to, pavement, sidewalks, parking areas and driveways, packed gravel or soil, or rooftops.

"Indian Country" or "Indian Country Lands" – defined at 40 CFR §122.2 as:

1. All land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;
2. All dependent Indian communities with the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and
3. All Indian allotments, the Indian titles to which have not been extinguished, including rights-of-ways running through the same.

"Infeasible" – for the purpose of this permit, infeasible means not technologically possible or not economically practicable and achievable in light of best industry practices. EPA notes that it does not intend for any permit requirement to conflict with state water rights law.

"Install" or "Installation" – when used in connection with stormwater controls, to connect or set in position stormwater controls to make them operational.

"Jar test" – a test designed to simulate full-scale coagulation/flocculation/sedimentation water treatment processes by taking into account the possible conditions.

"Landward" – positioned or located away from a waterbody, and towards the land.

"Large Construction Activity" – defined at 40 CFR § 122.26(b)(14)(x) and incorporated here by reference. Large construction activity includes clearing, grading, and excavating resulting in a land disturbance that will disturb equal to or greater than five acres of land or will disturb less than five acres of total land area but is part of a larger common plan of development or sale that will ultimately disturb equal to or greater than five acres. Large construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site.

"Linear Construction Site" – includes the construction of roads, bridges, conduits, substructures, pipelines, sewer lines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities in a long, narrow area.

"Minimize" – to reduce and/or eliminate to the extent achievable using stormwater controls that are technologically available and economically practicable and achievable in light of best industry practices.

"Mining Activity" – for the purposes of this permit, includes mining-related construction activities defined at 40 CFR 122.26(b)(14)(x) and 122.26(b)(15)(i), and active mining activities defined at 40 CFR 122.26(b)(14)(iii). Both of these sub categories of activities include earth-disturbing activities, with the latter also including such activities as: extraction, removal or recovery, and beneficiation of mined material from the earth; removal of overburden and waste rock to expose mineable material; and site reclamation and closure activities.

"Mining Operations" – for the purposes of this permit, mining operations are grouped into two distinct categories, with distinct effluent limits and requirements applicable to each: 1) earth-disturbing activities conducted prior to active mining activities; and 2) active mining activities, which includes reclamation.

"Municipal Separate Storm Sewer System" or "MS4" – defined at 40 CFR §122.26(b)(8) as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

1. Owned and operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special

districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

2. Designed or used for collecting or conveying stormwater;
3. Which is not a combined sewer; and
4. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

"National Pollutant Discharge Elimination System" (NPDES) – defined at 40 CFR §122.2 as the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of CWA. The term includes an 'approved program.'

"Native Topsoil" – the uppermost layer of naturally occurring soil for a particular area, and is often rich in organic matter, biological activity, and nutrients.

"Natural Buffer" – for the purposes of this permit, an area of undisturbed natural cover surrounding waters of the U.S. within which construction activities are restricted. Natural cover includes the vegetation, exposed rock, or barren ground that exists prior to commencement of earth-disturbing activities.

"Natural Vegetation" – vegetation that occurs spontaneously without regular management, maintenance, or species introductions or removals, and that generally has a strong component of native species..

"New Operator of a Permitted Site" – an operator that through transfer of ownership and/or operation replaces the operator of an already permitted construction site that is either a "new site" or an "existing site".

"New Site" – a site where construction activities commenced on or after February 16, 2017.

"New Source" – for the purposes of this permit, a construction project that commenced construction activities after February 1, 2010.

"New Source Performance Standards (NSPS)" – for the purposes of this permit, NSPS are technology-based standards that apply to construction sites that are new sources under 40 CFR 450.24.

"Non-Stormwater Discharges" – discharges that do not originate from storm events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, or pipe testing water.

"Non-Turbid" – a discharge that does not cause or contribute to an exceedence of turbidity-related water quality standards.

"Notice of Intent" (NOI) – the form (electronic or paper) required for authorization of coverage under the Construction General Permit.

"Notice of Termination" (NOT) – the form (electronic or paper) required for terminating coverage under the Construction General Permit.

"NPDES eReporting Tool" (NeT) – EPA's online system for submitting electronic Construction General Permit forms.

"Operational" – for the purposes of this permit, stormwater controls are made "operational" when they have been installed and implemented, are functioning as designed, and are properly maintained.

"Operator" – for the purposes of this permit and in the context of stormwater discharges associated with construction activity, any party associated with a construction project that meets either of the following two criteria:

1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
2. The party has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions.

This definition is provided to inform permittees of EPA's interpretation of how the regulatory definitions of "owner or operator" and "facility or activity" are applied to discharges of stormwater associated with construction activity. Subcontractors generally are not considered operators for the purposes of this permit.

"Ordinary High Water Mark" – the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris.

"Permitting Authority" – for the purposes of this permit, EPA, a Regional Administrator of EPA, or an authorized representative.

"Point(s) of Discharge" – see "Discharge Point."

"Point Source" – any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

"Pollutant" – defined at 40 CFR §122.2. A partial listing from this definition includes: dredged spoil, solid waste, sewage, garbage, sewage sludge, chemical wastes, biological materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial or municipal waste.

"Pollution Prevention Controls" – stormwater controls designed to reduce or eliminate the addition of pollutants to construction site discharges through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

"Polymers" – for the purposes of this permit, coagulants and flocculants used to control erosion on soil or to enhance the sediment removal capabilities of sediment traps or basins. Common construction site polymers include polyacrylamide (PAM), chitosan, alum, polyaluminum chloride, and gypsum.

"Prohibited Discharges" – discharges that are not allowed under this permit, including:

1. Wastewater from washout of concrete;
2. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
3. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;
4. Soaps or solvents used in vehicle and equipment washing;
5. Toxic or hazardous substances from a spill or other release; and

6. Waste, garbage, floatable debris, construction debris, and sanitary waste.

"Provisionally Covered Under this Permit" – for the purposes of this permit, EPA provides temporary coverage under this permit for emergency-related projects prior to receipt of a complete and accurate NOI. Discharges from earth-disturbing activities associated with the emergency-related projects are subject to the terms and conditions of the permit during the period of temporary coverage.

"Qualified Person" – a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

"Receiving Water" – a "Water of the United States" as defined in 40 CFR §122.2 into which the regulated stormwater discharges.

"Run-On" – sources of stormwater that drain from land located upslope or upstream from the regulated site in question.

"Semi-Arid Areas" – areas with an average annual rainfall of 10 to 20 inches.

"Shared Control" - for the purposes of this permit, a stormwater control, such as a sediment basin or pond, used by two or more operators that is installed and maintained for the purpose of minimizing and controlling pollutant discharges from a construction site with multiple operators associated with a common plan of development or sale.

"Small Construction Activity" – defined at 40 CFR §122.26(b)(15) and incorporated here by reference. A small construction activity includes clearing, grading, and excavating resulting in a land disturbance that will disturb equal to or greater than one (1) acre and less than five (5) acres of land or will disturb less than one (1) acre of total land area but is part of a larger common plan of development or sale that will ultimately disturb equal to or greater than one (1) acre and less than five (5) acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site.

"Small Residential Lot" – for the purpose of this permit, a lot being developed for residential purposes that will disturb less than 1 acre of land, but is part of a larger residential project that will ultimately disturb greater than or equal to 1 acre.

"Snowmelt" – the conversion of snow into overland stormwater and ground water flow as a result of warmer temperatures.

"Spill" – for the purpose of this permit, the release of a hazardous or toxic substance from its container or containment.

"Stabilization" – the use of vegetative and/or non-vegetative cover to prevent erosion and sediment loss in areas exposed through the construction process.

"Steep Slopes" – where a state, tribe, local government, or industry technical manual (e.g., stormwater BMP manual) has defined what is to be considered a "steep slope", this permit's definition automatically adopts that definition. Where no such definition exists, steep slopes are automatically defined as those that are 15 percent or greater in grade.

"Storm Sewer System" – a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) designed or used for collecting or conveying stormwater.

"Stormwater" – stormwater runoff, snowmelt runoff, and surface runoff and drainage.

"Stormwater Control" - refers to any best management practice or other method (including narrative effluent limitations) used to prevent or reduce the discharge of pollutants to waters of the United States.

"Stormwater Discharge Associated with Construction Activity" – as used in this permit, a discharge of pollutants in stormwater to waters of the United States from areas where earth-disturbing activities (e.g., clearing, grading, or excavation) occur, or where construction materials or equipment storage or maintenance (e.g., fill piles, borrow area, concrete truck chute washdown, fueling), or other industrial stormwater directly related to the construction process (e.g., concrete or asphalt batch plants), are located.

"Stormwater Inlet" – a structure placed below grade to conduct water used to collect stormwater runoff for conveyance purposes.

"Stormwater Team" – the group of individuals responsible for oversight of the development and modifications of the SWPPP, and oversight of compliance with the permit requirements. The individuals on the "Stormwater Team" must be identified in the SWPPP.

"Storm Event" – a precipitation event that results in a measurable amount of precipitation.

"Storm Sewer" – a system of pipes (separate from sanitary sewers) that carries stormwater runoff from buildings and land surfaces.

"Subcontractor" – for the purposes of this permit, an individual or company that takes a portion of a contract from the general contractor or from another subcontractor.

"SWPPP" (Stormwater Pollution Prevention Plan) – a site-specific, written document that, among other things: (1) identifies potential sources of stormwater pollution at the construction site; (2) describes stormwater controls to reduce or eliminate pollutants in stormwater discharges from the construction site; and (3) identifies procedures the operator will implement to comply with the terms and conditions of this general permit.

"Temporary Stabilization" – a condition where exposed soils or disturbed areas are provided temporary vegetative and/or non-vegetative protective cover to prevent erosion and sediment loss. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place to re-disturb this area.

"Thawing Conditions" – for the purposes of this permit, thawing conditions are expected based on the historical likelihood of two or more days with daytime temperatures greater than 32˚F. This date can be determined by looking at historical weather data. Note: the estimation of thawing conditions is for planning purposes only. During construction the permittee will be required to conduct site inspections based upon actual conditions (i.e., if thawing conditions occur sooner than expected, the permittee will be required to conduct inspections at the regular frequency).

"Threatened Species" – defined in the Endangered Species Act at 16 U.S.C. 1531 as any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

"Tier 2 Waters" – for antidegradation purposes, pursuant to 40 CFR 131.12(a)(2), those waters that are characterized as having water quality that exceeds the levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water.

"Tier 2.5 Waters" – for antidegradation purposes, those waters designated by states or tribes as requiring a level of protection equal to and above that given to Tier 2 waters, but less than that given Tier 3 waters. Some states have special requirements for these waters.

"Tier 3 Waters" – for antidegradation purposes, pursuant to 40 CFR 131.12(a)(3), Tier 3 waters are identified by states as having high quality waters constituting an Outstanding National Resource

Water (ONRW), such as waters of National Parks and State Parks, wildlife refuges, and waters of exceptional recreational or ecological significance.

"Total Maximum Daily Load" or "TMDL" – the sum of the individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background. If receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of mass per time, toxicity, or other appropriate measure.

"Toxic Waste" – see "Hazardous Substances."

"Treatment Chemicals" – polymers, flocculants, or other chemicals used to reduce turbidity in stormwater.

"Turbidity" – a condition of water quality characterized by the presence of suspended solids and/or organic material.

"Uncontaminated Discharge" – in the context of authorized non-stormwater discharges, a discharge that does not cause or contribute to an exceedance of applicable water quality standards.

"Upland" – the dry land area above and 'landward' of the ordinary high water mark.

"Upset" – Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond your reasonable control. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. See 40 CFR 122.41(n)(1).

"Water-Dependent Structures" – structures or facilities that are required to be located directly adjacent to a waterbody or wetland, such as a marina, pier, boat ramp, etc.

"Water Quality Standards" – defined in 40 CFR § 131.3, and are provisions of state or federal law which consist of a designated use or uses for the waters of the United States, water quality criteria for such waters based upon such uses, and an antidegradation policy to protect high-quality waters. Water quality standards protect the public health or welfare, enhance the quality of water and serve the purposes of the Act.

"Waters of the United States" – see definition at 40 CFR 122.2.

"Wetland" – those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. On-site evaluations are typically required to confirm the presence and boundaries of wetlands.

1. Acronyms

ACHP – Advisory Council on Historic Preservation

BMP – Best Management Practice

CBI – Confidential Business Information

CGP – Construction General Permit

CFR – Code of Federal Regulations

CWA – Clean Water Act

CZMA – Coastal Zone Management Act
ECHO – EPA Enforcement and Compliance History Online
ELG – Effluent Limitations Guideline
EPA – United States Environmental Protection Agency
ESA – Endangered Species Act
FR – Federal Register
MS4 – Municipal Separate Storm Sewer System
MSGP – Multi-Sector General Permit
NEPA – National Environmental Policy Act
NeT – NPDES eReporting Tool
NHPA – National Historic Preservation Act
NMFS – United States National Marine Fisheries Service
NPDES – National Pollutant Discharge Elimination System
NOI – Notice of Intent
NOT – Notice of Termination
NPDES – National Pollutant Discharge Elimination System
NRC – National Response Center
NRCS – National Resources Conservation Service
NSPS – New Source Performance Standards
ONRW – Outstanding National Resource Water
PAM – Polyacrylamide
POTW – Publicly Owned Treatment Works
RUSLE – Revised Universal Soil Loss Equation
SDS – Safety Data Sheet
SHPO – State Historic Preservation Office
SPCC – Spill Prevention Control and Countermeasure
SWPPP – Stormwater Pollution Prevention Plan
THPO – Tribal Historic Preservation Office
TMDL – Total Maximum Daily Load
TSS – Total Suspended Solids
UIC – Underground Injection Control
USDA – United States Department of Agriculture
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
WQS – Water Quality Standard

Appendix B - Permit Areas Eligible for Coverage and EPA Regional Addresses

Permit coverage for stormwater discharges from construction activity occurring within the following areas is provided by legally separate and distinctly numbered permits.

B.1 EPA Region 1

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 1:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
CTR10I000	Indian country within the State of Connecticut
MAR100000	Commonwealth of Massachusetts (except Indian country)
MAR10I000	Indian country within the State of Massachusetts
NHR100000	State of New Hampshire
RIR10I000	Indian country within the State of Rhode Island
VTR10F000	Areas in the State of Vermont subject to construction by a Federal Operator
01R10I000	All areas of Indian country not identified above that are not already covered by an EPA-approved permitting program

For stormwater discharges in EPA Region 1 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 1 Address:

U.S. EPA Region 1
Office of Ecosystem Protection
Stormwater and Construction Permits Section
5 Post Office Square, Suite 100
(OEP 06-1)
Boston, MA 02109-3912

B.2 EPA Region 2

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 2:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
NYR10I000	Indian country within the State of New York
PRR100000	Commonwealth of Puerto Rico
02R10I000	All areas of Indian country not identified above that are not already covered by an EPA-approved permitting program

For stormwater discharges in EPA Region 2 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 2 Address:

For Puerto Rico:
U.S. EPA Region 2
Caribbean Environmental Protection Division
NPDES Stormwater Program
City View Plaza II – Suite 7000
48 Rd. 165 Km 1.2
Guaynabo, PR 00968-8069

For New York:
U.S. EPA Region 2
NPDES Stormwater Program
290 Broadway, 24th Floor
New York, NY 10007-1866

B.3 EPA Region 3

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 3:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
DCR100000	District of Columbia
DER10F000	Areas in the State of Delaware subject to construction by a Federal Operator
VAR10I000	Indian country within the State of Virginia
03R10I000	All areas of Indian country not identified above that are not already covered by an EPA-approved permitting program

For stormwater discharges in EPA Region 3 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 3 Address:

U.S. EPA Region 3
Office of NPDES Permits and Enforcement
NPDES Permits Branch, Mailcode 3WP41
1650 Arch Street
Philadelphia, PA 19103

B.4 EPA Region 4

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 4:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
ALR10I000	Indian country within the State of Alabama
FLR10I000	Indian country within the State of Florida
MSR10I000	Indian country within the State of Mississippi
NCR10I000	Indian country within the State of North Carolina
04R10I000	All areas of Indian country not identified above that are not already covered by an EPA-approved permitting program (except Catawba lands in South Carolina)

For stormwater discharges in EPA Region 4 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 4 Address:

U.S. EPA Region 4
Water Protection Division
NPDES Stormwater Program
Atlanta Federal Center
61 Forsyth Street SW
Atlanta, GA 30303-3104

B.5 EPA Region 5

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 5:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
MIR10I000	Indian country within the State of Michigan
MNR10I000	Indian country within the State of Minnesota
WIR10I000	Indian country within the State of Wisconsin, except the Sokaogon Chippewa (Mole Lake) Community
05R10I000	All areas of Indian country not identified above that are not already covered by an EPA-approved permitting program

For stormwater discharges in EPA Region 5 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 5 Address:

U.S. EPA Region 5
NPDES Program Branch
77 W. Jackson Blvd.
Mail Code WN16J
Chicago, IL 60604-3507

B.6 EPA Region 6

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 6:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
LAR10I000	Indian country within the State of Louisiana
NMR100000	State of New Mexico, except Indian country
NMR10I000	Indian country within the State of New Mexico, except Navajo Reservation Lands that are covered under Arizona permit AZR10I000 and Ute Mountain Reservation Lands that are covered under Colorado permit COR10I000.
OKR10I000	Indian country within the State of Oklahoma
OKR10F000	Discharges in the State of Oklahoma that are not under the authority of the Oklahoma Department of Environmental Quality, including activities associated with oil and gas exploration, drilling, operations, and

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
	pipelines (includes SIC Groups 13 and 46, and SIC codes 492 and 5171), and point source discharges associated with agricultural production, services, and silviculture (includes SIC Groups 01, 02, 07, 08, 09).
TXR10F000	Discharges in the State of Texas that are not under the authority of the Texas Commission on Environmental Quality (formerly TNRCC), including activities associated with the exploration, development, or production of oil or gas or geothermal resources, including transportation of crude oil or natural gas by pipeline.
TXR10I000	Indian country within the State of Texas
06R10I000	All areas of Indian country not identified above that are not already covered by an EPA-approved permitting program

For stormwater discharges in EPA Region 6 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 6 Address:

U.S. EPA Region 6
NPDES Stormwater Program (WQ-PP)
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

B.7 EPA Region 7

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 7:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
IAR10I000	Indian country within the State of Iowa
KSR10I000	Indian country within the State of Kansas
NER10I000	Indian country within the State of Nebraska, except Pine Ridge Reservation lands (see Region 8)
07R10I000	All areas of Indian country not identified above that are not already covered by an EPA-approved permitting program

For stormwater discharges in EPA Region 7 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 7 Address:

U.S. EPA Region 7
NPDES Stormwater Program
11201 Renner Blvd
Lenexa, KS 66219

B.8 EPA Region 8

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 8:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
COR10F000	Areas in the State of Colorado, except those located on Indian country, subject to construction activity by a Federal Operator
COR10I000	Indian country within the State of Colorado, as well as the portion of the Ute Mountain Reservation located in New Mexico
MTR10I000	Indian country within the State of Montana
NDR10I000	Indian country within the State of North Dakota, as well as that portion of the Standing Rock Reservation located in South Dakota (except for the portion of the lands within the former boundaries of the Lake Traverse Reservation which is covered under South Dakota permit SDR10I000 listed below)
SDR10I000	Indian country within the State of South Dakota, as well as the portion of the Pine Ridge Reservation located in Nebraska and the portion of the lands within the former boundaries of the Lake Traverse Reservation located in North Dakota (except for the Standing Rock Reservation which is covered under North Dakota permit NDR10I000 listed above)
UTR10I000	Indian country within the State of Utah, except Goshute and Navajo Reservation lands (see Region 9)
WYR10I000	Indian country within the State of Wyoming
08R10I000	All areas of Indian country not identified above that are not already covered by an EPA-approved permitting program

For stormwater discharges in EPA Region 8 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 8 Address:

EPA Region 8 Storm Water Program
Mailcode: 8P-W-WW
1595 Wynkoop Street
Denver, CO 80202-1129

B.9 EPA Region 9

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 9:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
ASR100000	Island of American Samoa
AZR10I000	Indian country within the State of Arizona, as well as Navajo Reservation lands in New Mexico and Utah
CAR10I000	Indian country within the State of California
GUR100000	Island of Guam
JAR100000	Johnston Atoll
MPR100000	Commonwealth of the Northern Mariana Islands
MWR100000	Midway Island and Wake Island
NVR10I000	Indian country within the State of Nevada, as well as the Duck Valley Reservation in Idaho, the Fort McDermitt Reservation in Oregon and the Goshute Reservation in Utah
09R10I000	All areas of Indian country not identified above that are not already covered by an EPA-approved permitting program

For stormwater discharges in EPA Region 9 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 9 Address:

U.S. EPA Region 9
Water Division
NPDES Stormwater Program (WTR-2-3)
75 Hawthorne Street
San Francisco, CA 94105-3901

B.10 EPA Region 10

The permit offers coverage for stormwater discharges from construction activity from the following areas in EPA Region 10:

Permit No.	Areas of Coverage/Where EPA is Permitting Authority
AKR10I000	Indian country lands as defined in 18 U.S.C. 1151 within the State of Alaska
AKR10F000	Denali National Park and Preserve
IDR100000	State of Idaho, except Indian country
IDR10I000	Indian country within the State of Idaho, except Duck Valley Reservation lands (see Region 9)
ORR10I000	Indian country within the State of Oregon, except Fort McDermitt Reservation lands (see Region 9)
WAR10F000	Areas in the State of Washington, except those located on Indian country, subject to construction activity by a Federal Operator
WAR10I000	Indian country within the State of Washington

For stormwater discharges in EPA Region 10 outside the areas of coverage identified above, please contact your state NPDES permitting authority to obtain coverage under a state-issued NPDES permit.

EPA Region 10 Address:

U.S. EPA Region 10
NPDES Stormwater Program
1200 6th Avenue (OWW-191)
Seattle, WA 98101-3140

Appendix C - Small Construction Waivers and Instructions

These waivers are only available to stormwater discharges associated with small construction activities (i.e., 1-5 acres). As the operator of a small construction activity, you may be able to qualify for a waiver in lieu of needing to obtain coverage under this general permit based on: (A) a low rainfall erosivity factor, (B) a TMDL analysis, or (C) an equivalent analysis that determines allocations for small construction sites are not needed. Each operator, otherwise needing permit coverage, must notify EPA of its intention for a waiver. It is the responsibility of those individuals wishing to obtain a waiver from coverage under this general permit to submit a complete and accurate waiver certification as described below. Where the operator changes or another is added during the construction project, the new operator must also submit a waiver certification to be waived.

C.1 Rainfall Erosivity Waiver

Under this scenario the small construction project's rainfall erosivity factor calculation ("R" in the Revised Universal Soil Loss Equation) is less than five during the period of construction activity. The operator must certify to EPA that construction activity will occur only when the rainfall erosivity factor is less than five. The period of construction activity begins at initial earth disturbance and ends with final stabilization. Where vegetation will be used for final stabilization, the date of installation of a stabilization practice that will provide interim non-vegetative stabilization can be used for the end of the construction period, provided the operator commits (as a condition of waiver eligibility) to periodically inspect and properly maintain the area until the criteria for final stabilization as defined in the CGP have been met. If use of this interim stabilization eligibility condition was relied on to qualify for the waiver, signature on the waiver with its certification statement constitutes acceptance of and commitment to complete the final stabilization process. The operator must submit a waiver certification to EPA prior to commencing construction activities.

> *Note: The rainfall erosivity factor "R" is determined in accordance with Chapter 2 of Agriculture Handbook Number 703, Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE), pages 21–64, dated January 1997; United States Department of Agriculture (USDA), Agricultural Research Service.*

EPA has developed an online rainfall erosivity calculator to help small construction sites determine potential eligibility for the rainfall erosivity waiver. You can access the calculator from EPA's website at: https://www.epa.gov/npdes/rainfall-erosivity-factor-calculator-small-construction-sites. The R factor can easily be calculated by using the construction site latitude/longitude or address and estimated start and end dates of construction. This calculator may also be useful in determining the time periods during which construction activity could be waived from permit coverage. You may find that moving your construction activity by a few weeks or expediting site stabilization will allow you to qualify for the waiver. Use this online calculator or the Construction Rainfall Erosivity Waiver Fact Sheet (https://www.epa.gov/sites/production/files/2015-10/documents/fact3-1.pdf) to assist in determining the R Factor for your small construction site.

If you are the operator of the construction activity and eligible for a waiver based on low erosivity potential, you can submit a rainfall erosivity waiver electronically via EPA's NPDES eReporting Tool (NeT) (https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting), unless you received a waiver from your EPA Regional Office (see Part 1.4.1 of the CGP for information about receiving a waiver from electronic reporting).

Note: If the R factor is five or greater, you do not qualify for the rainfall erosivity waiver, and must obtain coverage under an NPDES permit (e.g., the CGP), unless you qualify for the Water Quality Waiver as described in section B below.

If your small construction project continues beyond the projected completion date given on the waiver certification, you must recalculate the rainfall erosivity factor for the new project duration. If the R factor is below five, you must update all applicable information on the waiver certification and retain a copy of the revised waiver as part of your records. The new waiver certification must be submitted prior to the projected completion date listed on the original waiver form to assure your exemption from permitting requirements is uninterrupted. If the new R factor is five or above, you must obtain NPDES permit coverage.

C.2 TMDL Waiver

This waiver is available if EPA has established or approved a TMDL that addresses the pollutant(s) of concern for the impaired water and has determined that controls on stormwater discharges from small construction activity are not needed to protect water quality. The pollutant(s) of concern include sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any waterbody that will receive a discharge from the construction activity. Information on TMDLs that have been established or approved by EPA is available from EPA online at https://www.epa.gov/tmdl and from state and tribal water quality agencies.

If you are the operator of the construction activity and eligible for a waiver based on compliance with an EPA-established or approved TMDL, you must provide the following information in order to be waived from permitting requirements:

1. Name, address and telephone number of the construction site operator(s);
2. Name (or other identifier), address, county or similar governmental subdivision, and latitude/longitude of the construction project or site;
3. Estimated construction start and completion (i.e., final stabilization) dates, and total acreage (to the nearest quarter acre) to be disturbed;
4. The name of the waterbody(s) that would be receiving stormwater discharges from your construction project;
5. The name and approval date of the TMDL;
6. A statement, signed and dated by an authorized representative as provided in Appendix I, Subsection I.11, that certifies that the construction activity will take place and that the stormwater discharges will occur, within the drainage area addressed by the TMDL.

C.3 Equivalent Analysis Waiver

This waiver is available for discharges to non-impaired waters only. The operator can develop an equivalent analysis that determines allocations for his/her small construction site for the pollutant(s) of concern or determines that such allocations are not needed to protect water quality. This waiver requires a small construction operator to develop an equivalent analysis based on existing in-stream concentrations, expected growth in pollutant concentrations from all sources, and a margin of safety.

If you are a construction operator who wants to use this waiver, you must develop your equivalent analysis and provide the following information to be waived from permitting requirements:

1. Name, address and telephone number of the construction site operator(s);

2. Name (or other identifier), address, county or similar governmental subdivision, and latitude/longitude of the construction project or site;
3. Estimated construction start and completion (i.e., final stabilization) dates, and total acreage (to the nearest quarter acre) to be disturbed;
4. The name of the waterbody(s) that would be receiving stormwater discharges from your construction project;
5. Your equivalent analysis;
6. A statement, signed and dated by an authorized representative as provided in Appendix I, Subsection I.11, that certifies that the construction activity will take place and that the stormwater discharges will occur, within the drainage area addressed by the equivalent analysis.

C.4 Waiver Deadlines and Submissions

1. Waiver certifications must be submitted prior to commencement of construction activities.
2. If you submit a TMDL or equivalent analysis waiver request, you are not waived until EPA approves your request. As such, you may not commence construction activities until receipt of approval from EPA.
3. Late Notifications: Operators are not prohibited from submitting waiver certifications after initiating clearing, grading, excavation activities, or other construction activities. The Agency reserves the right to take enforcement for any unpermitted discharges that occur between the time construction commenced and waiver authorization is granted.

Submittal of a waiver certification is an optional alternative to obtaining permit coverage for discharges of stormwater associated with small construction activity, provided you qualify for the waiver. Any discharge of stormwater associated with small construction activity not covered by either a permit or a waiver may be considered an unpermitted discharge under the Clean Water Act. As mentioned above, EPA reserves the right to take enforcement for any unpermitted discharges that occur between the time construction commenced and either discharge authorization is granted or a complete and accurate waiver certification is submitted. EPA may notify any operator covered by a waiver that they must obtain NPDES permit coverage. EPA may notify any operator who has been in non-compliance with a waiver that they may no longer use the waiver for future projects. Any member of the public may petition EPA to take action under this provision by submitting written notice along with supporting justification.

Complete and accurate TMDL or equivalent analysis waiver requests must be sent to the applicable EPA Regional Office address specified in Appendix B.

Appendix D - Eligibility Procedures Relating to Threatened and Endangered Species Protection

In accordance with Part 1.1.5 of the CGP, you must follow the procedures in this appendix to determine your eligibility under one of the criteria in Part D.1 of this appendix with respect to the protection of federally listed threatened or endangered species and federally designated "critical habitat" [hereinafter "threatened and endangered species"] under the Endangered Species Act (ESA) from discharges and discharge-related activities authorized under this permit. If you do not meet one of these criteria, you are not eligible for coverage under this permit.

While coordination between you and the U.S. Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS)(together, the "Services") is not necessarily required in all cases, EPA encourages you to coordinate with the Services, to document that coordination, and to do so early in the planning process prior to submitting your NOI.

This appendix is organized as follows:

- **Part D.1:** Threatened and Endangered Species Protection Eligibility Criteria
- **Part D.2:** Procedures for Determining Which Threatened and Endangered Species Protection Criteria Applies

D.1 Threatened and Endangered Species Protection Eligibility Criteria

You must certify in your NOI that you meet one of the eligibility criteria listed below in order to be eligible for coverage under this permit. Once you determine the applicable eligibility criterion, you must:

- Specify the basis for your selection of the applicable eligibility criterion, and if required, provide documentation that is the basis for your determination with the NOI form; and
- Provide documentation in your SWPPP that is sufficient to support your determination that you satisfy the requirements of the applicable criterion.

The definition of "action area," which is contained in Appendix A, is repeated below for convenience.

"Action Area" – all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. For the purposes of this permit and for application of the Endangered Species Act requirements, the following areas are included in the definition of action area:

- The areas on the construction site where stormwater discharges originate and flow toward the point of discharge into the receiving waters (including areas where excavation, site development, or other ground disturbance activities occur) and the immediate vicinity. (Example: Where bald eagles nest in a tree that is on or bordering a construction site and could be disturbed by the construction activity or where grading causes stormwater to flow into a small wetland or other habitat that is on the site that contains listed species.)
- The areas where stormwater discharges flow from the construction site to the point of discharge into receiving waters. (Example: Where stormwater flows into a ditch, swale, or gully that leads to receiving waters and where listed species (such as listed amphibians) are found in the ditch, swale, or gully.)
- The areas where stormwater from construction activities discharge into receiving waters and the areas in the immediate vicinity of the point of discharge. (Example: Where stormwater from construction activities discharges into a stream segment that is known to harbor listed aquatic species.)
- The areas where stormwater controls will be constructed and operated, including any areas where stormwater flows to and from the stormwater controls. (Example: Where a stormwater retention pond would be built.)

Criterion A. No ESA-listed species and/or designated critical habitat present in action area. Using the process outlined in Appendix D of this permit, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's "action area" as defined in Appendix A of this permit.

Basis statement content: A basis statement supporting the selection of this criterion should identify the USFWS and NMFS information sources used. Attaching aerial image(s) of the site to this NOI is helpful to EPA, USFWS, and NMFS in confirming eligibility under this criterion. Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers.

Criterion B. Eligibility requirements met by another operator under the 2017 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2017 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2017CGP operator's notification of authorization under this permit. If your certification is based on another 2017 CGP operator's certification under criterion C, you must provide EPA with the relevant supporting information required of existing dischargers in criterion C in your NOI form.

Basis statement content: A basis statement supporting the selection of this criterion should identify the eligibility criterion of the other CGP NOI, the authorization date, and confirmation that the authorization is effective.

Criterion C. Discharges not likely to adversely affect ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify to EPA that your site's discharges and discharge-related activities are not likely to adversely affect ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. You must also include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with this NOI.

Basis statement content: A basis statement supporting the selection of this criterion should identify the information resources and expertise (e.g., state or federal biologists) used to arrive at this conclusion. Any supporting documentation should explicitly state that both ESA-listed species and designated critical habitat under the jurisdiction of the USFWS and/or NMFS were considered in the evaluation.

Criterion D. Coordination with USFWS and/or NMFS has successfully concluded. Coordination between you and the USFWS and/or NMFS has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written concurrence from USFWS and/or NMFS that your site's discharges and discharge-related activities are not likely to adversely affect listed species and/or critical habitat. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI.

Basis statement content: A basis statement supporting the selection of this criterion should identify whether USFWS or NMFS or both agencies participated in coordination, the field office/regional office(s) providing that coordination, and the date that coordination concluded.

Criterion E. ESA Section 7 consultation has successfully concluded. Consultation between a Federal Agency and the USFWS and/or NMFS under section 7 of the ESA has concluded. The consultation must have addressed the effects of the construction site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS. To certify eligibility under this criterion, Indicate the result of the consultation:

I. biological opinion from USFWS and/or NMFS that concludes that the action in question (taking into account the effects of your site's discharges and discharge-related activities) is not likely to jeopardize the continued existence of listed species, nor the destruction or adverse modification of critical habitat; or

II. written concurrence from USFWS and/or NMFS with a finding that the site's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat.

You must include copies of the correspondence between yourself and the USFWS and/or NMFS in your SWPPP and this NOI.

Basis statement content: A basis statement supporting the selection of this criterion should identify the federal action agencie(s) involved, the field office/regional office(s) providing that consultation, any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the consultation was completed.

Criterion F. Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI.

Basis statement content: A basis statement supporting the selection of this criterion should identify whether USFWS or NMFS or both agencies provided a section 10 permit, the field office/regional office(s) providing permit(s), any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the permit was granted.

You must comply with any applicable terms, conditions, or other requirements developed in the process of meeting the eligibility criteria in this section to remain eligible for coverage under this permit. Documentation of these requirements must be kept as part of your SWPPP (see Part 7.2.9.a).

NMFS will, within 14 days of submission of the NOI, advise EPA whether it believes the planned discharges meet the eligibility criteria of not likely to adversely affect NMFS Listed Resources of Concern, whether the eligibility criterion could be met with additional conditions; or whether the eligibility criterion is not met. With respects to ESA issues, EPA recognizes NMFS expertise and will carefully consider NMFS' determination in identifying eligibility for authorization, either with or without additional conditions. In the event NMFS has placed a hold on your NOI, EPA will notify you as to whether your discharges are authorized or whether an individual permit will be required. If you do not hear from EPA within 14 days, you may assume that your discharge is authorized without further conditions.

D.2 Procedures for Determining Which Threatened and Endangered Species Protection Criterion Applies

You must follow the procedures in this Part to determine the criterion listed above under which your site is eligible for permit coverage.

D.2.1 Step 1 - Determine if Your Discharges and Discharge-Related Activities Were Already Addressed in Another Operator's Valid Certification that Included Your Action Area.

- **If your discharges and discharge-related activities <u>were</u> already addressed in another operator's valid certification that included your action area** (e.g., a general contractor or developer may have completed and filed an NOI for the entire action area with the necessary ESA certifications (Criterion A, C, D, E, or F)), *you may select eligibility Criterion B on your NOI form*.

  By certifying eligibility under Criterion B, you must comply with any terms and conditions imposed under the eligibility requirements of the criterion for which the other operator has established eligibility (either Criterion A, C, D, E, or F) to ensure that your discharges and discharge-related activities are protective of listed species and/or critical habitat.

  > *Note: If you are unable to meet these eligibility requirements, then you may either establish eligibility under one of the other criterion, or you may consider applying to EPA for an individual permit.*

  Under Criterion B, you must provide documentation in your SWPPP of any of these terms and conditions, as well as the other operator's basis for establishing eligibility. You must also provide a description of the basis for your selection of Criterion B on your NOI form, including the eligibility criterion (A, C, D, E, or F) that was certified to by the other operator, and must provide the NPDES ID from the other operator's notification of authorization under this permit.

  If your certification is based on another operator's certification under criterion C, you must provide the documentation required in the NOI for criterion C, namely: 1) what federally listed species and/or designated habitat are located in your "action area"; and 2) the distance between your site and the listed species or designated critical habitat (in miles).

- **If discharges and discharge-related activities from your site <u>were not</u> addressed in another operator's valid certification that included your action area,** you must follow the applicable procedures in Steps 2 through 5 below.

D.2.2 Step 2 - Determine if Listed Threatened or Endangered Species or their Designated Critical Habitat(s) are Likely to Occur in your Site's Action Area

You must determine, to the best of your knowledge, whether species listed as either threatened or endangered, or their critical habitat(s) (see definitions of these terms in Appendix A), are located in your site's action area. To make this determination, you should first determine if listed species and/or critical habitat are expected to exist in your county or township. The U.S. Fish and Wildlife Service and National Marine Fisheries Service maintain lists of federally listed endangered or threatened species on their internet sites.

- For National Marine Fisheries Service species and critical habitat information, use the following webpages, which provide up-to-date information on listed species (http://www.nmfs.noaa.gov/pr/species/esa/) and critical habitat (http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm). To determine the field office that corresponds to your site, go to http://www.nmfs.noaa.gov/ (under the left tab for "Regions").

  For National Marine Fisheries Service species in the Greater Atlantic Region, go to https://www.greateratlantic.fisheries.noaa.gov/protected/index.html.

- For Fish and Wildlife Service species information, use the on-line mapping tool IPaC (the Information, Planning, and Consultation System) located at http://ecos.fws.gov/ipac/, and follow these steps:
  - Select Get Started
  - Select Enter Project Location
  - Use an address, city name or other location to zoom into your project area
  - Use the zoom feature to see the entire extent of your action area on the screen
  - Use one of the mapping features (e.g., Polygon or line feature) to draw your action
- When you are done, press *Continue*.
- Select Request an Official Species List
- Complete the fields on the Official Species List Request page, and include "(CGP)" at the end of the project description. − For Classification, select "Water Quality Modification".
- Select the appropriate requesting agency/organization type (for most dischargers, this should be "Other").
- Submit the request to acquire an Official Species List, which should show both listed species as well as any designated critical habitat that are present in the action area in the previous step.
- *Note: If a link to an Official Species List is not available on the page, follow the web link of the office(s) indicated, or contact the office directly by mail or phone if a web link is not shown.*
- ***If listed species and/or critical habitat may exist in your action area, you must do one or more of the following***:
  - Conduct visual inspections. This method may be particularly suitable for construction sites that are smaller in size or located in non-natural settings such as highly urbanized areas or industrial parks where there is little or no natural habitat, or for construction activities that discharge directly into municipal stormwater collection systems.
  - Conduct a formal biological survey. In some cases, particularly for larger construction sites with extensive stormwater discharges, biological surveys may be an appropriate way to assess whether species are located in the action area and whether there are likely to be adverse effects to such species. Biological surveys are frequently performed by environmental consulting firms.
  - If required, conduct an environmental assessment under the National Environmental Policy Act (NEPA). Some construction activities might require review under NEPA for specific reasons, such as federal funding or other federal involvement in the project. Note: Coverage under the CGP does not trigger such a review for individual projects/sites. EPA has complied with NEPA in the issuance of the CGP.

    and

- Follow the instructions in Steps 3 – 5 below, as applicable. Note that many but not all measures imposed to protect listed species under these steps will also protect critical habitat. Thus, meeting the eligibility requirements of this CGP may require measures to protect critical habitat that are separate from those to protect listed species.

- ***If there are <u>no</u> listed species and <u>no</u> critical habitat areas in your action area,*** *you may check eligibility criterion A on your NOI form*. You must also provide a description of the basis for the criterion selected on your NOI form and provide documentation supporting the criterion selected in your SWPPP.

D.2.3 Step 3 - Determine if the Construction Activity's Discharges or Discharge-Related Activities Are Likely to Adversely Affect Listed Threatened or Endangered Species or Designated Critical Habitat

If in Step 2 you determine that listed species and/or critical habitat could exist in your action area, you must next assess whether your discharges or discharge-related activities are likely to adversely affect listed threatened or endangered species or designated critical habitat.

Potential adverse effects from discharges and discharge-related activities include:

- *Hydrological*. Stormwater discharges may cause siltation, sedimentation, or induce other changes in receiving waters such as temperature, salinity, or pH. These effects will vary with the amount of stormwater discharged and the volume and condition of the receiving water. Where a stormwater discharge constitutes a minute portion of the total volume of the receiving water, adverse hydrological effects are less likely. Construction activity itself may also alter drainage patterns on a site where construction occurs that can impact listed species or critical habitat.
- *Habitat*. Excavation, site development, grading, and other surface disturbance activities from construction activities, including the installation or placement of stormwater controls, may adversely affect listed species or their habitat. Stormwater may drain or inundate listed species habitat.
- *Toxicity*. In some cases, pollutants in stormwater may have toxic effects on listed species.

The scope of effects to consider will vary with each site. If you are having difficulty determining whether your project is likely to adversely affect listed species or critical habitat, or one of the Services has already raised concerns to you, you should contact the appropriate Services office for assistance.

- ***If adverse effects to listed threatened or endangered species or their critical habitat <u>are not</u> likely****, then you may select eligibility criterion C on the NOI form*. You must provide the following specific information on your NOI form: 1) the federally listed species and/or designated habitat are located in your "action area"; and 2) the distance between your site and the listed species or designated critical habitat (in miles). You must also provide a copy of your site map with your NOI.
- ***If adverse effects to listed threatened or endangered species or their critical habitat <u>are</u> likely,*** you must follow Step 4 below.

D.2.4 Step 4 - Determine if Measures Can Be Implemented to Avoid Adverse Effects

If you make a preliminary determination in Step 3 that adverse effects from your construction activity's discharges or discharge-related activities are likely to occur, you can still receive coverage under eligibility criterion C of the CGP if appropriate measures are undertaken to avoid or eliminate the likelihood of adverse effects prior to applying for CGP coverage.

These measures may involve relatively simple changes to construction activities such as re-routing a stormwater discharge to bypass an area where species are located, relocating stormwater controls, or by modifying the "footprint" of the construction activity. If you are unable to ascertain which measures to implement to avoid the likelihood of adverse effects, you must coordinate or enter into consultation with the Fish and Wildlife Service and/or National Marine Fisheries Service, in which case you would not be eligible for coverage under eligibility criterion C, but may instead be eligible for coverage under eligibility criterion D, E, or F (described in more detail in Step 5).

- **If you are able to install and implement appropriate measures to avoid the likelihood of adverse effects,** *then you may check eligibility criterion C on the NOI form*. The measures you adopt to avoid or eliminate adverse effects must be implemented for the duration of the construction project and your coverage under the CGP. You must also provide a description of the basis for the criterion selected, and the following specific information on your NOI form: 1) the federally listed species and/or designated habitat are located in your "action area"; and 2) the distance between your site and the listed species or designated critical habitat (in miles).
- **If you cannot ascertain which measures to implement to avoid the likelihood of adverse effects,** you must follow the procedures in Step 5**.**

D.2.5 Step 5 - Determine if the Eligibility Requirements of Criterion D, E, or F Can Be Met

If in Step 4 you cannot ascertain which measures to implement to avoid the likelihood of adverse effects, you must contact the Fish and Wildlife Service and/or the National Marine Fisheries Service. You may still be eligible for CGP coverage if likely adverse effects can be addressed through meeting criterion D, E, or F.

- **Criterion D:** Coordination between you and the Services has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on federally-listed threatened or endangered species and federally-designated critical habitat, and resulted in a written concurrence from the relevant Service(s) that your site's discharges and discharge-related activities are not likely to adversely affect listed species or critical habitat.

  If you have met the requirements of criterion D, *you may select eligibility criterion D on the NOI form*. You must provide a description of the basis for the criterion selected on your NOI form and must include copies of the correspondence between you and the applicable Service in your SWPPP.

- **Criterion E:** Consultation between a Federal Agency and the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service under section 7 of the ESA has concluded. The consultation must have addressed the effects of the construction site's discharges and discharge-related activities on federally-listed threatened or endangered species and federally-designated critical habitat. The result of this consultation must be either (1) a biological opinion that concludes that the action in question (taking into account the effects of your site's discharges and discharge-related activities) is not likely to jeopardize the

continued existence of listed species, nor the destruction or adverse modification of critical habitat; or (2) written concurrence from the applicable Service(s) with a finding that the site's discharges and discharge-related activities are not likely to adversely affect federally-listed species or federally-designated habitat.

For more information on section 7 consultation, see 50 CFR §402. If you receive a "jeopardy opinion," you may continue to work with the Fish and Wildlife Service and/or National Marine Fisheries Service and your permitting authority to modify your project so that it will not jeopardize listed species or designated critical habitat.

Note that most consultations are accomplished through informal consultation. When conducting informal ESA section 7 consultation as a non-federal representative, you must follow the procedures found in 50 CFR Part 402 of the ESA regulations. You must notify the Services of your intention and agreement to conduct consultation as a non-federal representative.

Consultation may also occur in the context of another federal action at the construction site (e.g., where ESA section 7 consultation was performed for issuance of a wetlands dredge and fill permit for the project or where a NEPA review is performed for the project that incorporates a section 7 consultation).

Any terms and conditions developed through consultations to protect listed species and critical habitat must be incorporated into the SWPPP. As noted above, operators may, if they wish, initiate consultation with the Services at Step Four.

Whether ESA section 7 consultation must be performed with either the Fish and Wildlife Service, National Marine Fisheries Service, or both Services depends on the listed species that may be affected by the operator's activity. In general, the National Marine Fisheries Service has jurisdiction over marine, estuarine, and anadromous species. Operators should also be aware that while formal section 7 consultation provides protection from incidental takings liability, informal consultation does not.

If you have met the requirements of criterion E, *you may select eligibility criterion E on the NOI form.* You must provide a description of the basis for the criterion selected on your NOI form and must include copies of the correspondence between yourself and the Services in your SWPPP.

- **Criterion F:** Your construction activities are authorized through the issuance of a permit under section 10 of the ESA, and this authorization addresses the effects of the site's discharges and discharge-related activities on federally-listed species and federally-designated critical habitat.

  You must follow Fish and Wildlife Serivce and/or National Marine Fisheries Service procedures when applying for an ESA section 10 permit (see 50 CFR §17.22(b)(1) for Fish and Wildlife Service and §222.22 for National Marine Fisheries Service). Application instructions for section 10 permits can be obtained from http://www.fws.gov and http://www.nmfs.noaa.gov or by contacting the appropriate Service office.

  If you have met the requirements of criterion F, *you may select eligibility criterion F on the NOI form.* You must provide a description of the basis for the criterion selected on your NOI form and must include copies of the correspondence between yourself and the Services in your SWPPP.

Appendix E – Historic Property Screening Process

Background

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of Federal "undertakings", such as the issuance of this permit, on historic properties that are either listed on, or eligible for listing on, the National Register of Historic Places. To address any issues relating to historic properties in connection with the issuance of this permit, EPA developed the screening process in this appendix that enables construction operators to appropriately consider the potential impacts, if any, of their installation of stormwater controls on historic properties and to determine whether actions can be taken, if applicable, to mitigate any such impacts. Although the coverages of individual construction sites under this permit do not constitute separate Federal undertakings, the screening process in this appendix provides an appropriate site-specific means of addressing historic property issues in connection with EPA's issuance of the permit.

Key Terms

Historic property- prehistoric or historic districts, sites, buildings, structures, or objects that are included in or eligible for inclusion in the National Register of Historic Places, including artifacts, records, and remains that are related to and located within such properties

SHPO – The State Historic Preservation Officer for a particular state

THPO or Tribal representative – The Tribal Historic Preservation Officer for a particular tribe or, if there is no THPO, the representative designated by such tribe for NHPA purposes

Instructions for All Construction Operators

You are required to follow the screening process in this appendix to determine if your installation of stormwater controls on your site has the potential to cause effects to historic properties, and whether or not you need to contact your SHPO, THPO, or other tribal representative for further information. **You may not submit your NOI until you have completed this screening process.** The following four steps describe how applicants can meet the historic property requirements under this permit:

Step 1 *Are you installing any stormwater controls that require subsurface earth disturbance?*[1]

The first step of the screening process is to determine if you will install stormwater controls that cause subsurface earth disturbance. The installation of the following types of stormwater controls require subsurface earth disturbance:[2]

- Dikes
- Berms
- Catch Basins
- Ponds
- Ditches

[1] You are only required to consider earth-disturbing activities related to the installation of stormwater controls in the NHPA screening process. You are not reqired to consider other earth-disturbing activities at the site. If you are installing one of the above stormwater controls or another type of control that requires subsurface earth disturbance, your stormwater controls have the potential to have an effect on historic properties. If this is the case, then you must proceed to Step 2.

[2] This list is not intended to be exhaustive. Other stormwater controls that are not on this list may involve earth-disturbing activities and must also be examined for the potential to affect historic properties.

- Trenches
- Culverts
- Channels
- Perimeter Drains
- Swales

If you are not installing one of the above stormwater controls or another type of control that requires subsurface earth disturbance, then you may indicate this on your NOI, and no further screening is necessary. During the 14-day waiting period after submitting your NOI, the SHPO, THPO, or other tribal representative may request that EPA hold up authorization based on concerns about potential adverse effects to historic properties. EPA will evaluate any such request and notify you if any additional controls to address adverse effects to historic properties are necessary.

Step 2 *Have prior professional cultural resource surveys or other evaluations determined that historic properties do not exist, or have prior disturbances precluded the existence of historic properties?*

If you are installing a stormwater control that requires subsurface earth disturbance, you must next determine if no historic properties exist on your site based on prior professional cultural resource surveys or other evaluations, or if the existence of historic properties has been precluded because of prior earth disturbances.

If prior to your project it has already been determined that no historic properties exist at your site based on available information, including information that may be provided by your applicable SHPO, THPO, or other tribal representative, then you may indicate this on your NOI, and no further screening steps are necessary. Similarly, if prior earth disturbances have eliminated the possibility that historic properties exist on your site, you may indicate this on your NOI, and no further screening steps are necessary. After submitting your NOI, and during the 14-day waiting period, the SHPO, THPO, or other tribal representative may request that EPA hold up authorization based on concerns about potential adverse effects to historic properties. EPA will evaluate any such request and notify you if any additional measures to address adverse effects to historic properties are necessary.

If neither of these circumstances exists for your project, you must proceed to Step 3.

Step 3 *If you are installing any stormwater controls that require subsurface earth disturbance, you must determine if these activities will have an effect on historic properties.*

If your answer to the question in Step 2 is "no", then you must assess whether your earth-disturbing activities related to the installation of stormwater controls will have an effect on historic properties. This assessment may be based on historical sources, knowledge of the area, an assessment of the types of earth-disturbing activities you are engaging in, considerations of any controls and/or management practices you will adopt to ensure that your stormwater control-related earth-disturbing activities will not have an effect on historic properties, and any other relevant factors. If you determine based on this assessment that earth disturbances related to the installation of your stormwater controls will have no effect on historic properties, you may indicate this on your NOI, and document the basis for your determination in your SWPPP, and no further screening steps are necessary. After submitting your NOI, and during the 14-day waiting period, the SHPO, THPO, or other tribal representative may request that EPA hold up authorization based on concerns about potential adverse effects to historic properties. EPA will evaluate any such request and notify you if any additional measures to address adverse effects to historic properties are necessary.

If none of the circumstances in Steps 1 - 3 exist for your project, you must proceed to Step 4.

Step 4: *If you are installing any stormwater controls that require subsurface earth disturbance and you have not satisfied the conditions in Steps 1 - 3, you must contact and consult with the appropriate historic preservation authorities.*

Where you are installing stormwater controls that require subsurface earth disturbance, and you cannot determine in Step 3 that these activities will have no effect on historic properties, then you must contact the relevant SHPO, THPO, or other tribal representative to request their views as to the likelihood that historic properties are potentially present on your site and may be impacted by the installation of these controls.

> *Note: Addresses for SHPOs and THPOs may be found on the Advisory Council on Historic Preservation's website (www.achp.gov/programs.html). If a tribe does not have a THPO, you should contact the appropriate tribal government office designated by the tribe for this purpose.*

You must submit the following minimum information in order to properly initiate your request for information:

1. Project name (*i.e.*, the name or title most commonly associated with your project);
2. A narrative description of the project;
3. Name, address, phone and fax number, and email address (if available) of the operator;
4. Most recent U.S. Geological Survey (USGS) map section (7.5 minute quadrangle) showing actual project location and boundaries clearly indicated; and
5. Sections of the SWPPP site map (see Part 7.2.4) that show locations where stormwater controls that will cause subsurface earth disturbance will be installed (see Step 1).

Without submitting this minimum information, you will not have been considered to have properly initiated your request. You will need to provide the SHPO, THPO, or other tribal representative **a minimum of 15 calendar days** after they receive these materials to respond to your request for information about your project.

If you do not receive a response within 15 calendar days after receipt by the SHPO, THPO, or other tribal representative of your request, then you may indicate this on your NOI, and no further screening steps are necessary. Or, if the applicable SHPO, THPO, or other tribal representative responds to your request with an indication that no historic properties will be affected by the installation of stormwater controls at your site, then you may indicate this on your NOI, and no further screening steps are necessary. After submitting your NOI, and during the 14-day waiting period, the SHPO, THPO, or other tribal representative may request that EPA hold up authorization based on concerns about potential adverse effects to historic properties. EPA will evaluate any such request and notify you if any additional measures to address adverse effects to historic properties are necessary.

If within 15 calendar days of receipt of your request the applicable SHPO, THPO, or other tribal representative responds with a request for additional information or for further consultation regarding appropriate measures for treatment or mitigation of effects on historic properties caused by the installation of stormwater controls on your site, you must comply with this request and proceed to Step 5.

Step 5: *Consultation with your applicable SHPO, THPO, or other tribal representative.*

If, following your discussions with the appropriate historic preservation authorities in Step 4, the applicable SHPO, THPO, or tribal represenative requests additional information or further consultation, you must respond with such information or consult to determine impacts to historic properties that may be caused by the installation of stormwater controls on your site and appropriate measures for treatment or mitigation of such impacts. If as a result of your

discussions with the applicable SHPO, THPO, or tribal representative, you enter into, and comply with, a written agreement regarding treatment and/or mitigation of impacts on your site, then you may indicate this on your NOI, and no further screening steps are necessary.

If, however, agreement on an appropriate treatment or mitigation plan cannot be reached between you and the SHPO, THPO, or other tribal representative within 30 days of your response to the SHPO, THPO, or other tribal representative's request for additional information or further consultation, you may submit your NOI, but you must indicate that you have not negotiated measures to avoid or mitigate such effects. You must also include in your SWPPP the following documentation:

1. Copies of any written correspondence between you and the SHPO, THPO, or other tribal representative; and
2. A description of any significant remaining disagreements as to mitigation measures between you and the SHPO, THPO, or other tribal representative.

After submitting your NOI, and during the 14-day waiting period, the SHPO, THPO, ACHP or other tribal representative may request that EPA place a hold on authorization based upon concerns regarding potential adverse effects to historic properties. EPA, in coordination with the ACHP, will evaluate any such request and notify you if any additional measures to address adverse effects to historic properties are necessary.

Appendix F - List of Tier 3, Tier 2, and Tier 2.5 Waters

EPA's CGP has special requirements for discharges to waters that receive Tier 2, Tier 2.5, or Tier 3 protections for antidegradation purposes. See Parts 1.1.8 and 3.2.

EPA's antidegradation regulation, at 40 CFR 131.12, provides a framework for maintaining and protecting water quality for: (1) existing uses (known as "Tier 1"); (2) high quality waters by establishing a process for authorizing the lowering of water quality where existing water quality exceeds levels needed to support propagation of fish, shellfish, and wildlife and recreation in and on the water (known as "Tier 2"); and (3) for Outstanding National Resource Waters (known as "Tier 3"). While EPA's antidegradation regulation only outlines three levels of antidegradation protection, some states and tribes include an additional level of antidegradation protection between Tier 2 and Tier 3 (sometimes known as "Tier 2.5").

High quality (Tier 2) waters may be identified on a parameter-by-parameter basis or on a water body-by-water body basis consistent with the requirements of 40 CFR 131.12(a)(2). States and tribes using a parameter-by-parameter basis (sometimes called a "pollutant-by-pollutant approach") do not maintain a list of Tier 2 waters, but instead identify a high quality water at the time an entity proposes an activity that would lower water quality. In contrast, states and tribes using a water body-by-water body basis typically identify high quality waters in advance on a list by weighing a variety of factors (*e.g.*, chemical, physical, biological, and other information) to classify a water body's overall quality.

The list below is provided as a resource for operators who must determine whether they discharge to a Tier 2, Tier 2.5, or Tier 3 water. Where available, the table lists waters specifically identified for Tier 2, Tier 2.5, or Tier 3 protection by a water quality standard authority (*e.g.*, a state or tribe). Operators should not assume that a water does not receive Tier 2, Tier 2.5, or Tier 3 protection solely based on the absence of information in this table. Evaluation regarding antidegradation protections for a specific water may need to be done on a case-by-case basis, especially where the state or tribe uses the parameter-by-parameter approach to identify whether water quality is better than necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water.

<table>
<tr><th>Permit Number</th><th colspan="2">Areas of Coverage/Where EPA Is Permitting Authority</th></tr>
<tr><td rowspan="5">MAR100000</td><td colspan="2">Commonwealth of Massachusetts, except Indian Country lands</td></tr>
<tr><td colspan="2">Tier 2, Tier 2.5, and 3 waters are identified and listed in the Massachusetts Water Quality Standards 314 CMR 4.00. Surface water qualifiers that correspond with Tier classifications are defined at 314 CMR 4.06(1)(d)m and listed in tables and figures at the end of 314 CMR 4.06. See MassDEP's web page at: http://www.mass.gov/eea/agencies/massdep/water/regulations/314-cmr-4-00-mass-surface-water-quality-standards.html. See also:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-massachusetts</td></tr>
<tr><td>Tier 2</td><td>Listed as "High Quality Waters", and all wetlands that are not designated as an Outstanding Resource Water.</td></tr>
<tr><td>Tier 2.5</td><td>Listed as "Outstanding Resource Water", "Public Water Supply", "Tributary to Public Water Supply", all wetlands bordering Outstanding Resource Waters, and vernal pools.</td></tr>
<tr><td>Tier 3</td><td>Defined as "Special Resource Water". Note: No waters have been identified as a Special Resource Water as of the issuance of this permit.</td></tr>
</table>

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority	
NHR100000	**State of New Hampshire**	
	Tier 2 waters are identified on a parameter-by-parameter basis. Tier 2.5 and 3 waters are identified and listed in the New Hampshire Water Quality Standards CHAPTER Env-Wq 1700. Description of the antidegradation tiers are included at CHAPTER Env-Wq 1708 and listed in the tables at. New dischargers and new sources should contact EPA Region 1's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-new-hampshire	
	Tier 3	Env-Ws 1708.05(a) Surface waters of national forests and surface waters designated as "natural" under RSA 483:7-a, I shall be considered outstanding resource waters (ORW). "Natural waters" are listed at http://www.gencourt.state.nh.us/rsa/html/L/483/483-15.htm. Surface waters of national forests are not included in an official list. For further questions, new dischargers and new sources should contact EPA Region 1's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional.
NYR10I000	**Saint Regis Mohawk Tribe (NY)**	
	Tier 2 waters are identified on a parameter-by-parameter basis. There is not a Tier 2.5 classification identified in the Saint Regis Mohawk Tribe Water Quality Standards. New dischargers and new sources should contact EPA Region 2's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See: https://www.epa.gov/sites/production/files/2014-12/documents/stregis-tribe.pdf	
	Tier 3	Outstanding Resource Waters. Those waters designated as such by the Tribe. The Waters that may be considered for designation as Outstanding Resource Waters include, but are not limited to, water bodies that are recognized as: (i) Important because of protection through official action, such as Tribal, Federal or State law, Presidential or secretarial action, international treaty, or interstate compact; (ii) Having exceptional recreational significance; (iii) Having exceptional ecological significance; (iv) Having other special environmental, recreational, religious or ecological attributes; or waters whose designation as Outstanding Resource Waters is reasonably necessary for the protection of other waters so designated. New dischargers and new sources should contact EPA Region 2's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional.

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority	
PRR100000	**Commonwealth of Puerto Rico**	
	Tier 2 waters are identified on a parameter-by-parameter basis. There is not a Tier 2.5 classification identified in the Puerto Rico Water Quality Standards. New dischargers and new sources should contact EPA Region 2's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-puerto-rico	
	Tier 3	Tier III waters are those which are classified as either Class SA or Class SE. Class SA waters are defined as "Coastal waters and estuarine waters of high quality and/or exceptional ecological or recreational value whose existing characteristics shall not be altered, except by natural causes, in order to preserve the existing natural phenomena." Class SA waters include bioluminiscent lagoons and bays such as La Parguera and Monsio José on the Southern Coast, Bahía de Mosquito in Vieques, and any other coastal or estuarine waters of exceptional quality of high ecological value or recreational which may be designated by Puerto Rico, through Resolution, as requiring this classification for protection of the waters. Class SE waters are defined as "Surface waters and wetlands of exceptional ecological value, whose existing characteristics should not be altered in order to preserve the existing natural phenomena." Class SE waters include Laguna Tortuguero, Laguna Cartagena and any other surface water bodies of exceptional ecological value as may be designated by Puerto Rico through Resolution.
DCR100000	**District of Columbia**	
	New dischargers and new sources should contact EPA Region 3's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. Tier 2.5 waters are identified and listed in the District of Columbia Water Quality Standards. See: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-washington-dc	
	Tier 2.5	Rule 1102.4 SPECIAL WATERS OF THE DISTRICT OF COLUMBIA (SWDC): Any segment or segments of the surface waters of the District that are of water quality better than needed for the current use or have scenic or aesthetic importance shall be designated as Special Waters of the District of Columbia (SWDC). Rock Creek and its tributaries and Battery Kemble Creek and its tributaries are considered Special Waters of the District of Columbia (SWDC) under its antidegradation program.
FLR10I000	**Miccosukee Tribe (FL)**	
	New dischargers and new sources should contact EPA Region 4's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. The Miccosukee Tribe Water Quality Standards includes an additional tier of protection between Tier 2 and 3 that is referred as Tier 2 ¾ for Outstanding Miccosukee Waters. See: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-miccosukee-tribe-indians-florida	

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority	
	Tier 2 ¾	Outstanding Miccosukee Waters (OMW): The Miccosukee Tribe recognizes that the waters of its Federal Reservation which are contained within Water Conservation Area 3-A and the Miccosukee Reserved Area constitute the Tribe's highest quality waters and must be preserved in as pristine a condition as possible while at the same time allowing for the activities of man. These ecologically important waters are essential to the survival of the Miccosukee Tribe, therefore: The Miccosukee Tribe hereby designates the waters of its Federal Reservation which are contained within Water Conservation Area 3-A (North Grass, South Grass, Gap) and Miccosukee Reserved Area as Class III-A and Outstanding Miccosukee waters (OMW). The North Grass is defined as that area bounded by the northern boundary of the reservation, the eastern edge of the L-28 levee (which is east of the L-28 canal), the southern edge of the C-60 Canal, and the eastern boundary of the reservation. The South Grass is defined as the area bounded by southern edge of the C-60 canal, the eastern boundary of the reservation, the southern boundary of the reservation, the eastern edge of the L-28 canal (which is south of the L-28 Tieback Canal), a line running north from the L-28 Canal (where the L-28 Canal turns northwest to become the L-28 Tieback Canal) until this line intersects the oil pipeline, the center of the oil pipeline until the oil pipeline intercepts the L-28 Interceptor Canal, and the eastern edge of the L-28 levee (which is east of the L-28 Canal). The Gap is defined as that area which is bounded by the southern boundary of the reservation, the western boundary of the reservation, the northeastern edge of the L-28 Interceptor Canal, the oil pipeline which runs generally south from the L-28 Interceptor Canal until the pipeline intercepts a line running north from the L-28 Canal where the L-28 canal turns northwest to become the L-28 Tieback Canal, and the eastern edge of the L-28 canal (which is south of the L-28 Tieback Canal).
	Tier 3	Tier 3: Outstanding Natural Resource Waters (ONRW): Where high quality waters constitute an Outstanding Tribal resource such as waters of parks and wildlife refuges and waters of exceptional ecological and recreational significance, that water quality shall be maintained and protected. These waters shall be designated as Outstanding Natural Resource Waters (ONRW). Currently, no Tribal waters are designated as ONRW.
	Seminole Tribe (FL)	
	New dischargers and new sources should contact EPA Region 4's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/sites/production/files/2014-12/documents/seminole_floridawqs.pdf	

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority	
MNR10I000	**Fond du Lac Band of MN Chippewa**	
	Tier 2 waters are identified on a parameter-by-parameter basis. There is not a Tier 2.5 classification identified in the Fond du Lac Band of MN Chippewa Water Quality Standards. New dischargers and new sources should contact EPA Region 5's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-fond-du-lac-band-minnesota-chippewa-tribe	
	Tier 3	Six Lakes are presently identified as Tier 3/Outstanding Reservation Resource Waters (ORRW): (1) Dead Fish Lake; (2) Jaskari Lake; (3) Miller (Mud) Lake; (4) Perch Lake; (5) Rice Portage Lake; (6) Wild Rice Lake.
	Grand Portage Band of MN Chippewa	
	Tier 2 waters are identified on a parameter-by-parameter basis. Two subcategories of protection (referred to as outstanding tribal water resource (OTWR)) exist in the Grand Portage Band of MN Chippewa Water Quality Standards as follows: (a) OTWR-Restricted (lowered water quality may be allowed under limited circumstances); (b) OTWR-Prohibited (Discharges and permanent lowering of water quality are prohibited). New dischargers and new sources should contact EPA Region 5's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-grand-portage-band-minnesota-chippewa-tribe	
	Tier 2	OTWR-Restricted: All waters, not already classified as Tier 3, are high quality Tier 2 waters (see Grand Portage Reservation Water Quality Standards, Section VI & VII, Pages 14-16).
	Tier 3	OTWR-Prohibited: "The portion of Lake Superior north of latitude 47 degrees, 57 minutes, 13 seconds, east of Hat Point, south of the Minnesota-Ontario boundary, and west of the Minnesota-Michigan boundary" (see Section VII, Page 16).
WIR10I000	**Bad River Band of Lake Superior Chippewa (WI)**	
	Tier 2 waters are identified on a water body-by-water body basis. Tier 2, 2.5, and 3 classifications are included in the Bad River Band of Lake Superior Chippewa Water Quality Standards. See: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-bad-river-band-lake-superior-chippewa-tribe	
	Tier 2	Any surface water not specifically classified as Outstanding Tribal Resource Water or Outstanding Resource Water is classified as Exceptional Resource Water (Anishinaabosibiing).
	Tier 2.5	Outstanding Resource Waters: a portion of Bad River, from downstream the confluence with the White River to Lake Superior, White River, Marengo River, Graveyard Creek, Bear Trap Creek, Wood Creek, Brunsweiler River, Tyler Forks, Bell Creek, and Vaughn Creek.

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority	
	Tier 3	Outstanding Tribal Resource Waters: Kakagon Slough and the lower wetland reaches of its tributaries that support wild rice, Kakagon River, Bad River Slough, Honest John Lake, Bog Lake, a portion of Bad River, from where it enters the Reservation through the confluence with the White River, and Potato River.
	Lac du Flambeau Band of the Lake Superior Chippewa	
	Tier 2 waters are identified on a water body-by-water body basis. Tier 2, 2.5, and 3 classifications are included in the Lac du Flambeau Band of the Lake Superior Chippewa Water Quality Standards. See: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-lac-du-flambeau-band-lake-superior-chippewa-tribe	
	Tier 2	All named waters, including wetlands, not specified under an Antidegradation classification are classified as Tribal Resource Water (Tier 2). Unclassified Named Waters (Tier 2): Buckskin Lake; Flambeau Lake; Long (Interlaken) Lake); Marland's Lake (Sec. 13, T40NR4E); Moss Lake; Pokegema Lake.
	Tier 2.5	Exceptional Tribal Resource Waters: Bills Lake, Birch Lake, Bobidosh Lake, Bog Lake (SE SE Sec. 31, T40NR6E), Bolton Lake, Broken Bow Lake, Chewalah Lake, Clear Lake (Sec. 2, T39NR4E), Corn Great, Great, Corn Lake, Little "Least/Lesser", Crawling Stone Lake, Big, Crawling Stone Lake, Little, Crescent Lake, Crooked Lake, Big, David Lake, Ellerson Lake, Middle, Ellerson Lake, West, Elsie Lake "Boundary Lake", Fat Lake, Fence Lake, Gresham Creek, Green Lake (NW NW Sec. 19, T41R6E), Grey Lake, Gunlock Lake, Haskell Lake, Headflyer Lake (Sec. 19, T41NR5E), Highway Lake (NW NW Sec. 19, T41NR5E), Horsehead Lake (SE SW Sec. 9, T40NR5E), Hutton's Creek, Ike Walton Lake, Lily Lake (SE SW Sec. 35, T40NR5E), Little Ten Lake, Lodge Lake "L. Rice" (NW NW Sec. 8, T41NR6E), Lucy Lake, Mindys Lake (Sec. 8, T40NR5E), Minette Lake, Mitten Lake, Monk's Lake (Sec. 13, T40NR5E), Moving Cloud Lake, Mud Creek, Muskesin Lake, Patterson Lake, Placid Twin Lake (North), Placid Twin Lake (South), Plummer Lake, Poupart Lake, Prairie Lake (NE SW Sec. 13, T40NR4E), Raven Lake, Ross Allen Lake, Sand Lake, Little, Scott Lake (Sec. 22, T40N, R4E), Shishebogama Lake, Signal Lake, Snort Lake (Sec. 5, T41N, R6E), Spring Lake "Jerms", Squirrel Lake, Statenaker Lake "Hollow", Stearns Lake "Hourglass", Sugarbush "Hidden Lake" (NW NW Sec. 17, T41NR5E), Sugarbush Creek, Sugarbush Lake, Little, Sugarbush Lake, Lower, Sugarbush Lake, Middle, Sugarbush Lake, Upper, Sunfish Lake, Tippecanoe Lake, Tomahawk River, To-To Tom Lake, Toulish Lake, Trout River, Warrior Lake, White Sand Lake, Whitefish Lake "Cattail Lake" (Sec. 34, T40N5R), Wishow Lake, Wyandock Lake.
	Tier 3	Outstanding Tribal Resource Waters: Bear River (1st bridge to Reservation boundary), Big Springs (Sec. 25, T40NR4E), Black Lake, Cranberry Lake, Doud Lake, Eagle Lake, Gene Lake, Johnson Springs, Little Trout Lake, Lost Lake (Sect. 1, T41NR4E), Mishonagon Creek, Munnomin (Jesse, Duck) Lake, Negani (Hegani) Lake, Reservation Line Lake, Spring Creek, Tank Lake, Thomas Lake, Wild Rice Lake, Zee Lake.

<table>
<tr><th>Permit Number</th><th colspan="2">Areas of Coverage/Where EPA Is Permitting Authority</th></tr>
<tr><td rowspan="4">NMR100000</td><td colspan="2">State of New Mexico</td></tr>
<tr><td colspan="2">Tier 2 waters are identified on a parameter-by-parameter basis. There is not a Tier 2.5 classification identified in the State of New Mexico Water Quality Standards. New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-new-mexico</td></tr>
<tr><td>Tier 2</td><td>If you need assistance determining if your discharge is to a Tier 2 waterbody, please contact the NMED Surface Water Quality Bureau's Stormwater Program at https://www.env.nm.gov/swqb/StormWater/index.html.</td></tr>
<tr><td>Tier 3</td><td>See https://www.env.nm.gov/swqb/ONRW/ for current list of NMED's Tier 3/Outstanding National Resource Waters. See also New Mexico's Water Quality Standards at 20.6.4.9.D NMAC.</td></tr>
<tr><td rowspan="9">NMR10I000</td><td colspan="2">Ohkay Owingeh (NM) (formerly the Pueblo of San Juan)</td></tr>
<tr><td colspan="2">New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-ohkay-owingeh-pueblo-formerly-pueblo-san-juan</td></tr>
<tr><td colspan="2">Pueblo of Acoma (NM)</td></tr>
<tr><td colspan="2">New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-acoma</td></tr>
<tr><td colspan="2">Pueblo of Isleta (NM)</td></tr>
<tr><td colspan="2">New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-isleta</td></tr>
<tr><td colspan="2">Pueblo of Nambe (NM)</td></tr>
<tr><td colspan="2">New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-nambe</td></tr>
<tr><td colspan="2">Pueblo of Picuris (NM)</td></tr>
<tr><td colspan="2">New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. Tier 2, 2.5, and 3 classifications are included in the Pueblo of Picuris Water Quality Standards. See:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-picuris</td></tr>
</table>

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority	
	Pueblo of Pojoaque (NM)	
	New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-pojoaque	
	Pueblo of Sandia (NM)	
	New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-sandia	
	Pueblo of Santa Ana (NM)	
	New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-santa-ana	
	Pueblo of Santa Clara (NM)	
	New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-santa-clara	
	Pueblo of Taos (NM)	
	New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-taos	
	Tier 3	Outstanding Tribal Resource Waters: Mountain Lakes; Mountain Streams & Springs;
	Pueblo of Tesuque (NM)	
	New dischargers and new sources should contact EPA Region 6's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pueblo-tesuque	
COR10I000	**Ute Mountain Ute Tribe**	
	Tier 2 waters are identified on a parameter-by-parameter basis. There is not a Tier 2.5 classification identified in the Ute Mountain Ute Tribe Water Quality Standards. New dischargers and new sources should contact EPA Region 8's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also:	

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority	
	https://www.epa.gov/wqs-tech/water-quality-standards-regulations-ute-mountain-ute-tribe	
	Tier 3	Outstanding Tribal Resource Waters: 1. Ute Spring and unnamed creek from Ute Spring downstream within Section 12, TWP35N R18W (Colorado). 2. Allen Canyon Creek, Sections 17, 20, 29, 30, 31, TWP 35S, R21E (Utah) 3. "Lopez" Spring and unnamed creek tributary to and downstream from the spring, within Section 35, TWP 34N, R18W
MTR10I000	**Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation (MT)**	
	Tier 2 waters are identified on a water body-by-water body basis. There is not a Tier 2.5 classification identified in the Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation Water Quality Standards. New dischargers and new sources should contact EPA Region 8's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-assiniboine-and-sioux-tribes-fort-peck-indian	
	Tier 2	Most Tribal Waters will qualify as Tier 2 waters. Unless the water body is not attaining the Clean Water Act Section 101(a)(2) goals, the water body has received an OTRW designation, or there is no assimilative capacity for pollutants to protect existing and designated uses, it is likely that the water body will receive Tier 2 protection.
	Confederated Salish and Kootenai Tribes of the Flathead Reservation (MT)	
	Tier 2 waters are identified on a water body-by-water body basis. There is not a Tier 2.5 classification identified in the Confederated Salish and Kootenai Tribes of the Flathead Reservation Water Quality Standards. New dischargers and new sources should contact EPA Region 8's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-confederated-salish-and-kootenai-tribes-flathead	
	Tier 3	The following are Tier 3 waters: All waters located within Tribally designated primitive or wilderness areas.
	Northern Cheyenne (MT)	
	Tier 2 waters are identified on a water body-by-water body basis. There is not a Tier 2.5 classification identified in the Northern Cheyenne Water Quality Standards. New dischargers and new sources should contact EPA Region 8's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-northern-cheyenne-tribe-northern-cheyenne-reservation	
ASR100000	**Island of American Samoa**	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/sites/production/files/2014-12/documents/aswqs.pdf	

<table>
<tr><th>Permit Number</th><th colspan="2">Areas of Coverage/Where EPA Is Permitting Authority</th></tr>
<tr><td rowspan="8">AZR10I000</td><td colspan="2">Hopi Tribe (AZ)</td></tr>
<tr><td colspan="2">Tier 2 waters are identified on a parameter-by-parameter basis. There is not a Tier 2.5 classification identified in the Hopi Tribe Water Quality Standards. New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-hopi-tribe</td></tr>
<tr><td>Tier 3</td><td>Unique Waters: In the Moencopi Wash watershed, from Blue Canyon Springs to the confluence of Begashibito Wash.</td></tr>
<tr><td colspan="2">Hualapai Indian Tribe (AZ)</td></tr>
<tr><td colspan="2">Tier 2 waters are identified on a parameter-by-parameter basis. There is not a Tier 2.5 classification identified in the Hualapai Indian Tribe Water Quality Standards. New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-hualapai-tribe</td></tr>
<tr><td>Tier 3</td><td>Segments assigned as Tier 3: Spencer; Meriwhitica; Willow Spring; Upper Milkweed Spring; Bridge Canyon; Travertine Spring; Travertine Falls; Diamond Creek; Diamond Creek Spring; Blue Mountain; Metuck; Peach Springs Spring; Westwater; Clay Tank; Hocky Puck; Pocamote Spring; Mohawk Spring; Granite Spring; Three Spring; Warm Spring; Honga Spring; National Canyon Spring; National Canyon; Moss Spring.</td></tr>
<tr><td colspan="2">Navajo Nation (AZ, NM, UT)</td></tr>
<tr><td colspan="2">New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-navajo-nation</td></tr>
<tr><td colspan="2">White Mountain Apache Tribe (AZ)</td></tr>
<tr><td colspan="2">Tier 2 waters are identified on a water body-by-water body basis. Tier classifications are identified in Appendix B of the White Mountain Apache Tribe Water Quality Standards. New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also:
https://www.epa.gov/wqs-tech/water-quality-standards-regulations-white-mountain-apache-tribe</td></tr>
</table>

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority	
	Tier 2	High Quality Waters: East Fork White River, above R52 Road; Paradise Creek, above Wohlenberg; Ord Creek; Smith Cienega; Bull Cienega; Smith Creek; Big Bonito; Tonto Creek, below Y47 Crossing; Crooked Creek; Boggy Creek; Little Bonito Creek, above Y55 Crossing; Flash Creek; Squaw Creek; Hurricane Lake; Hurricane Creek; Hughey Creek; Bonito Cienega; West Fork Black River; Hall Cienega; Purcell Cienega; Thompson Creek; Cibecue Creek in Box Canyon to Salt river; Rock Springs Creek; Willow Creek (Lower Canyon Cr.). Sensitive Waters (treated the same manner as Tier 2): East Fork White River below R52 Road, above Rock Cr; Lofer Cienega Creek; Carrizo Creek above Corduroy; Cedar Creek; Big Canyon (E. Cedar Creek); Middle Cedar Creek; West Cedar Creek; Cibecue Creek, Box Canyon up to Confluence with Salt Creek; Spring Creek; Salt Creek; Cibecue Creek, from confluence w/Salt Cr. To Big Springs; Cibecue Creek, above Big Springs; Salt Draw; Canyon Creek S. of Chediski Farms; Oak Creek; Canyon Creek, N. of Chediski Farms.
	Tier 3	Outstanding Waters: East Fork White River, in Wilderness area; Pumpkin Lake.
CAR10I000	**Big Pine Band of Owens Valley (CA)**	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-big-pine-paiute-tribe-owens-valley	
	Hoopa Valley Tribe (CA)	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-hoopa-valley-tribe	
	Paiute-Shoshone Indians of the Bishop Community (CA)	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-bishop-paiute-tribe	
	Twenty-Nine Palms (CA)	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-twenty-nine-palms-band-mission-indians	

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority	
GUR100000	**Island of Guam**	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/sites/production/files/2014-12/documents/aswqs.pdf	
JAR100000	**Johnston Atoll**	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional	
MPR100000	**Commonwealth of the Northern Mariana Islands**	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/sites/production/files/2014-12/documents/aswqs.pdf	
MWR100000	**Midway Island and Wake Island**	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional	
NVR10000I	**Pyramid Lake Paiute (NV)**	
	New dischargers and new sources should contact EPA Region 9's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-pyramid-lake-paiute-tribe	
IDR100000	**State of Idaho**	
	Tier 2 waters are identified on a water body-by-water body basis. There is not a Tier 2.5 classification identified in the State of Idaho Water Quality Standards. New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-idaho	
	Tier 2 and Tier 3	For Tier 2 and Tier 3 waters, please consult the most recent approved version of Idaho's Idaho Integrated Report, available at: http://www.deq.idaho.gov/water-quality/surface-water/monitoring-assessment/integrated-report/ and the closest regional office of the Idaho Department of Environmental Quality: http://www.deq.idaho.gov/regional-offices-issues/.
IDR10I000	**Coeur D'Alene Tribe (ID)**	
	Tier 2 waters are identified on a water body-by-water body basis. There is not a Tier 2.5 classification identified in the Coeur D'Alene Tribe Water Quality Standards. New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-coeur-dalene-tribe-indians	

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority
ORR10I000	**Confederated Tribes of the Warm Springs Reservation (OR)**
	New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-confederated-tribes-warm-springs-indian-reservation
	Confederated Tribes of Umatilla (OR)
	New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-confederated-tribes-umatilla-indian-reservation-oregon
WAR10I000	**Confederated Tribes of the Chehalis Reservation (WA)**
	Tier 2 waters are identified on a parameter-by-parameter basis. There is not a Tier 2.5 classification identified in the Confederated Tribes of the Chehalis Reservation Water Quality Standards. New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. https://www.epa.gov/wqs-tech/water-quality-standards-regulations-confederated-tribes-chehalis-reservation
	Confederated Tribes of the Colville Reservation (WA)
	EPA established federal water quality standards for the Confederated Tribes of the Colville Reservation at 40 CFR 131.35. See: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-confederated-tribes-colville-reservation
	Kalispel Indian Community (WA)
	New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-kalispel-indian-community-kalispel-reservation
	Lummi Tribe (WA)
	New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-lummi-nation
	Makah Indian Nation (WA)
	New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-makah-indian-nation

Permit Number	Areas of Coverage/Where EPA Is Permitting Authority
	Port Gamble S'Klallam (WA)
	New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-port-gamble-sklallam-tribe
	Puyallup Tribe of Indians (WA)
	New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-puyallup-tribe-indians
	Spokane Tribe of Indians (WA)
	New dischargers and new sources should contact EPA Region 10's stormwater coordinator found at https://www.epa.gov/npdes/contact-us-stormwater#regional. See also: https://www.epa.gov/wqs-tech/water-quality-standards-regulations-spokane-tribe-indians

Appendix G – Buffer Requirements

The purpose of this appendix is to assist you in complying with the requirements in Part 2.2.1 of the permit regarding the establishment of natural buffers and/or equivalent sediment controls. This appendix is organized as follows:

G.1 SITES THAT ARE REQUIRED TO PROVIDE AND MAINTAIN NATURAL BUFFERS AND/OR EQUIVALENT EROSION AND SEDIMENT CONTROLS

The requirement in Part 2.2.1 to provide and maintain natural buffers and/or equivalent erosion and sediment controls applies for any discharges to waters of the U.S. located within 50 feet of your site's earth disturbances. If the water of the U.S. is not located within 50 feet of earth-disturbing activities, Part 2.2.1 does not apply. See Figure G-1.

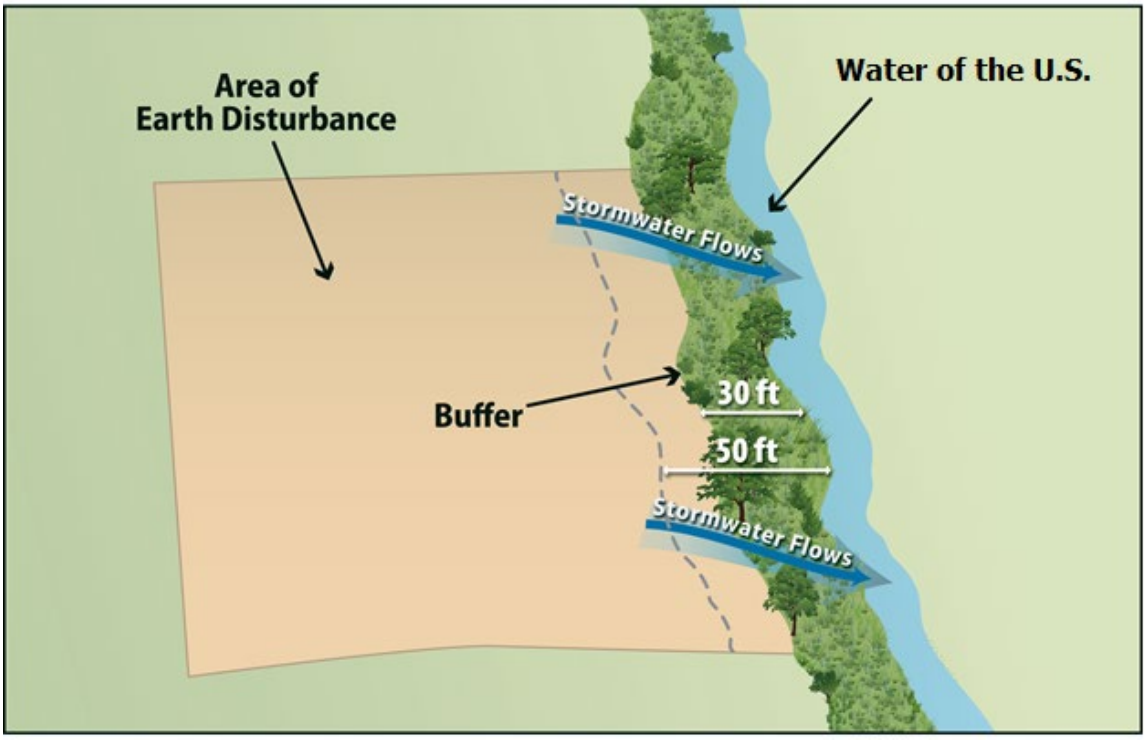


Figure G-1 Example of earth-disturbing activities within 50 feet of a water of the U.S.

G.2 COMPLIANCE ALTERNATIVES AND EXCEPTIONS

G.2.1 Compliance Alternatives

If Part 2.2.1 applies to your site, you have three compliance alternatives from which you can choose, unless you qualify for any of the exceptions (see below and Part 2.2.1.a):

1. Provide and maintain a 50-foot undisturbed natural buffer; or
2. Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or
3. If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. [1]

The compliance alternative selected must be maintained throughout the duration of permit coverage.

See Part G.2.2 below for exceptions to the compliance alternatives.

See Part G.2.3 for requirements applicable to providing and maintaining natural buffers under compliance alternatives 1 and 2 above.

See Part G.2.4 for requirements applicable to providing erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer under compliance alternatives 2 and 3 above.

G.2.2 Exceptions to the Compliance Alternatives

The following exceptions apply to the requirement to implement one of the Part 2.2.1.a compliance alternatives (see also Part 2.2.1.b):

- The following disturbances within 50 feet of a water of the U.S. are exempt from the requirements Part 2.2.1 and this Appendix:
  - Construction approved under a CWA Section 404 permit; or
  - Construction of a water-dependent structure or water access areas *(e.g., pier, boat ramp, trail)*.
- If there is no discharge of stormwater to waters of the U.S. through the area between the disturbed portions of the site and any waters of the U.S. located within 50 feet of your site, you are not required to comply with the requirements in Part 2.2.1 and this Appendix. This includes situations where you have implemented controls measures, such as a berm or other barrier, that will prevent such discharges.
- Where no natural buffer exists due to preexisting development disturbances *(e.g., structures, impervious surfaces)* that occurred prior to the initiation of planning for the current development of the site, you are not required to comply with the requirements in Part 2.2.1 and this Appendix.

  Where some natural buffer exists but portions of the area within 50 feet of the water of the U.S. are occupied by preexisting development disturbances, you <u>are</u> required to comply with the requirements in Part 2.2.1 and this Appendix. For the purposes of calculating the sediment load reduction for either compliance alternative 2 or 3, you are not expected to compensate for the reduction in buffer function that would have resulted from the area covered by these preexisting disturbances. Clarity about how to implement the compliance alternatives for these situations is provided in G.2.3 and G.2.4 below.

  If during your project, you will disturb any portion of these preexisting disturbances, the area removed will be deducted from the area treated as a "natural buffer."
- For "linear construction sites" (see Appendix A), you are not required to comply with this requirement if site constraints *(e.g., limited right-of-way)* make it infeasible to implement one of the Part 2.2.1.a compliance alternatives, provided that, to the extent feasible, you limit disturbances within 50 feet of any waters of the U.S. and/or you provide supplemental erosion and sediment controls to treat stormwater discharges from earth disturbances within 50 feet of the water of the U.S. You must also document in your SWPPP your rationale for why it is infeasible for you to implement one of the Part 2.2.1.a compliance alternatives, and describe any buffer width retained and supplemental erosion and sediment controls installed.
- For "small residential lot" construction *(i.e., a lot being developed for residential purposes that will disturb less than 1 acre of land, but is part of a larger residential*

project that will ultimately disturb greater than or equal to 1 acre), you have the option of complying with one of the "small residential lot" compliance alternatives in Part G.3 of this appendix.

Note that you must document in your SWPPP if any disturbances related to any of the above exceptions occurs within the buffer area on your site.

G.2.3 Requirements for Providing and Maintaining Natural Buffers

This part of the appendix applies to you if you choose compliance alternative 1 (50-foot buffer), compliance alternative 2 (a buffer of < 50 feet supplemented by additional erosion and sediment controls that achieve the equivalent sediment load reduction as the 50-foot buffer), or if you are providing a buffer in compliance with one of the "small residential lot" compliance alternatives in Part G.3.

Buffer Width Measurement

Where you are retaining a buffer of any size, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the water:

1. The ordinary high water mark of the water body, defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or
2. The edge of the stream or river bank, bluff, or cliff, whichever is applicable.

Refer to Figure G-2 and Figure G-3. You may find that specifically measuring these points is challenging if the flow path of the water of the U.S. changes frequently, thereby causing the measurement line for the buffer to fluctuate continuously along the path of the waterbody. Where this is the case, EPA suggests that rather than measuring each change or deviation along the water's edge, it may be easier to select regular intervals from which to conduct your measurement. For instance, you may elect to conduct your buffer measurement every 5 to 10 feet along the length of the water.

Additionally, note that if earth-disturbing activities will take place on both sides of a water of the U.S. that flows through your site, to the extent that you are establishing a buffer around this water, it must be established on both sides. For example, if you choose compliance alternative 1, and your project calls for disturbances on both sides of a small stream, you would need to retain the full 50 feet of buffer on both sides of the water. However, if your construction activities will only occur on one side of the stream, you would only need to retain the 50-foot buffer on the side of the stream where the earth-disturbance will occur.

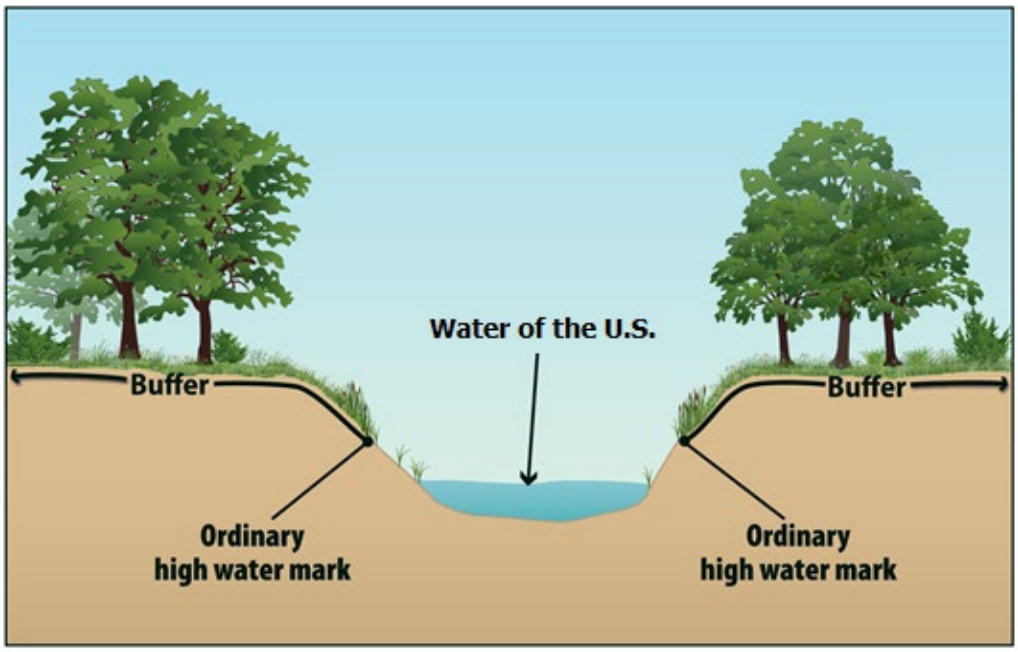


Figure G-2 Buffer measurement from the ordinary high water mark of the water body, as indicated by a clear natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, and/or the presence of litter/debris.

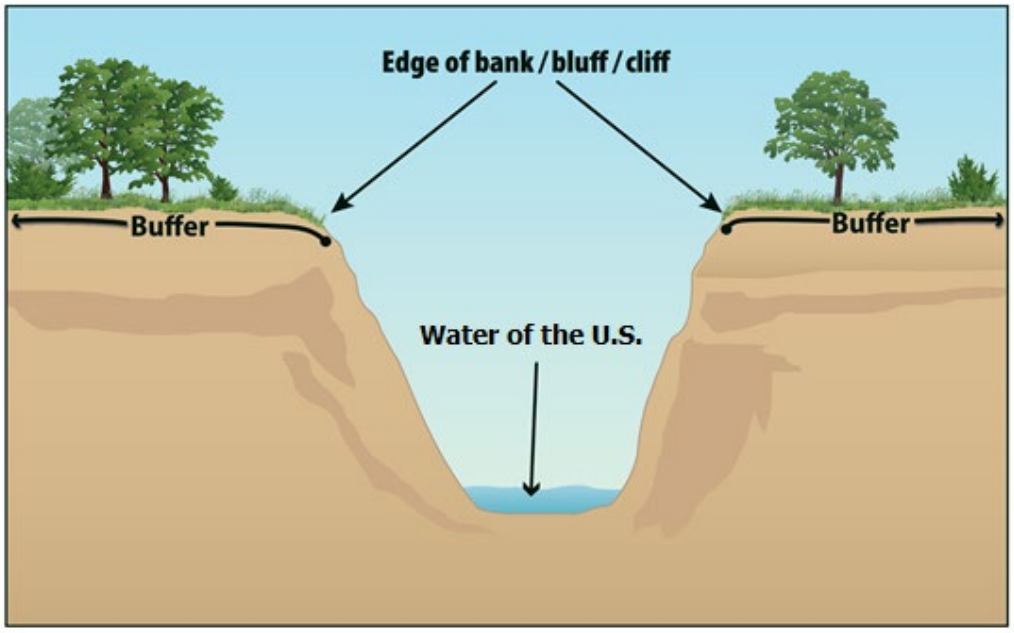


Figure G-3 Buffer measurement from the edge of the bank, bluff, or cliff, whichever is applicable.

Limits to Disturbance Within the Buffer

You are considered to be in compliance with the requirement to provide and maintain a natural buffer if you retain and protect from construction activities the natural buffer that existed prior to the commencement of construction. If the buffer area contains no vegetation prior to the commencement of construction (e.g., sand or rocky surface), you are not required to plant vegetation. As noted above, any preexisting structures or

impervious surfaces may occur in the natural buffer provided you retain and protect from disturbance the buffer areas outside of the preexisting disturbance.

To ensure that the water quality protection benefits of the buffer are retained during construction, you are prohibited from conducting any earth-disturbing activities within the buffer during permit coverage. In furtherance of this requirement, **prior to commencing earth-disturbing activities on your site, you must delineate, and clearly mark off, with flags, tape, or a similar marking device, the buffer area on your site.** The purpose of this requirement is to make the buffer area clearly visible to the people working on your site so that unintended disturbances are avoided.

While you are not required to enhance the quality of the vegetation that already exists within the buffer, you are encouraged to do so where such improvements will enhance the water quality protection benefits of the buffer. (Note that any disturbances within the buffer related to buffer enhancement are permitted and do not constitute construction disturbances.) For instance, you may want to target plantings where limited vegetation exists, or replace existing vegetation where invasive or noxious plant species (see http://plants.usda.gov/java/noxiousDriver) have taken over. In the case of invasive or noxious species, you may want to remove and replace them with a diversity of native trees, shrubs, and herbaceous plants that are well-adapted to the climatic, soil, and hydrologic conditions on the site. You are also encouraged to limit the removal of naturally deposited leaf litter, woody debris, and other biomass, as this material contributes to the ability of the buffer to retain water and filter pollutants.

If a portion of the buffer area adjacent to the water of the U.S. is owned by another party and is not under your control, you are only required to retain and protect from construction activities the portion of the buffer area that is under your control. For example, if you comply with compliance alternative 1 (provide and maintain a 50-foot buffer), but 10 feet of land immediately adjacent to the water of the U.S. is owned by a different party than the land on which your construction activities are taking place and you do not have control over that land, you must only retain and protect from construction activities the 40-foot buffer area that occurs adjacent to the property on which your construction activities are taking place. EPA would consider you to be in compliance with this requirement regardless of the activities that are taking place in the 10-foot area that is owned by a different party than the land on which your construction activities are taking place that you have no control over.

Discharges to the Buffer

You must ensure that all discharges from the area of earth disturbance to the natural buffer are first treated by the site's erosion and sediment controls (*for example, you must comply with the Part 2.2.3 requirement to install sediment controls along any perimeter areas of the site that will receive pollutant discharges*), **and if necessary to prevent erosion caused by stormwater flows within the buffer, you must use velocity dissipation devices**. The purpose of this requirement is to decrease the rate of stormwater flow and encourage infiltration so that the pollutant filtering functions of the buffer will be achieved. To comply with this requirement, construction operators typically will use devices that physically dissipate stormwater flows so that the discharge entering the buffer is spread out and slowed down.

SWPPP Documentation

You are required to document in your SWPPP the natural buffer width that is retained. For example, if you are complying with alternative 1, you must specify in your SWPPP that you are providing a 50-foot buffer. Or, if you will be complying with alternative 2, you must document the reduced width of the buffer you will be retaining (and you must also

describe the erosion and sediment controls you will use to achieve an equivalent sediment reduction, as required in Part G.2.4 below). Note that you must also show any buffers on your site map in your SWPPP consistent with Part 7.2.4.i. Additionally, if any disturbances related to the exceptions in Part G.2.2 occur within the buffer area, you must document this in the SWPPP.

G.2.4 Guidance for Providing the Equivalent Sediment Reduction as a 50-foot Buffer

This part of the appendix applies to you if you choose compliance alternative 2 (provide and maintain a buffer that is less than 50 feet that is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot buffer) or compliance alternative 3 (implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot buffer).

Determine Whether it is Feasible to Provide a Reduced Buffer

EPA recognizes that there will be a number of situations in which it will be infeasible to provide and maintain a buffer of any width. While some of these situations may exempt you from the buffer requirement entirely (see G.2.2), if you do not qualify for one of these exemptions, there still may be conditions or circumstances at your site that make it infeasible to provide a natural buffer. For example, there may be sites where a significant portion of the property on which the earth-disturbing activities will occur is located within the buffer area, thereby precluding the retention of natural buffer areas.

Therefore, you should choose compliance alternative 2 if it is feasible for you to retain some natural buffer on your site. (Note: For any buffer width retained, you are required to comply with the requirements in Part G.2.3, above, concerning the retention of vegetation and restricting earth disturbances.) Similarly, if you determine that it is infeasible to provide a natural buffer of any size during construction, you should choose alternative 3.

Design Controls That Provide Equivalent Sediment Reduction as 50-foot Buffer

You must next determine what additional controls must be implemented on your site that, alone or in combination with any retained natural buffer, achieve a reduction in sediment equivalent to that achieved by a 50-foot buffer.

Note that if only a portion of the natural buffer is less than 50 feet, you are only required to implement erosion and sediment controls that achieve the sediment load reduction equivalent to the 50-foot buffer for discharges through that area. You would not be required to provide additional treatment of stormwater discharges that flow through 50 feet or more of natural buffer. See Figure G-4.

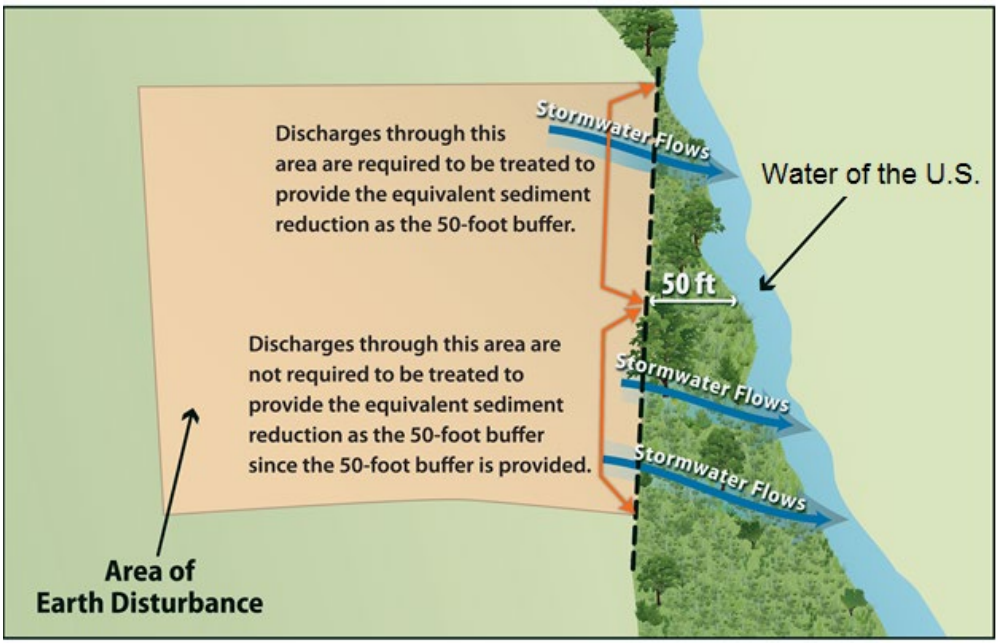


Figure G-4 Example of how to comply with the requirement to provide the equivalent sediment reduction when only a portion of your earth-disturbances discharge to a buffer of less than 50-feet.

Steps to help you meet compliance alternative 2 and 3 requirements are provided below.

Step 1 - Estimate the Sediment Reduction from the 50-foot Buffer

In order to design controls that match the sediment removal efficiency of a 50-foot buffer, you first need to know what this efficiency is for your site. The sediment removal efficiencies of natural buffers vary according to a number of site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of erosion and sediment controls used to reduce the discharge of sediment prior to the buffer. EPA has simplified this calculation by developing buffer performance tables covering a range of vegetation and soil types for the areas covered by the CGP. See Attachment 1 of this Appendix, Tables G-8 through G-15. Note: buffer performance values in Tables G-8 through G-15 represent the percent of sediment captured through the use of perimeter controls (e.g., silt fences) and 50-foot buffers at disturbed sites of fixed proportions and slopes.[1]

[1] EPA used the following when developing the buffer performance tables:

- The sediment removal efficiencies are based on the U.S. Department of Agriculture's RUSLE2 ("Revised Universal Soil Loss Equation 2") model for slope profiles using a 100-foot long denuded slopes.
- Sediment removal was defined as the annual sediment delivered at the downstream end of the 50-foot natural buffer (tons/yr/acre) divided by the annual yield from denuded area (tons/yr/acre).
- As perimeter controls are also required by the CGP, sediment removal is in part a function of the reduction due to a perimeter control (i.e., silt fence) located between the disturbed portion of the site and the upstream edge of the natural buffer and flow traveling through a 50-foot buffer of undisturbed natural vegetation.
- It was assumed that construction sites have a relatively uniform slope without topographic features that accelerate the concentration for erosive flows.

Using Tables G-8 through G-15 (see Attachment 1 of this Appendix), you can determine the sediment removal efficiency of a 50-foot buffer for your geographic area by matching the vegetative cover type that best describes your buffer area and the type of soils that predominate at your site. For example, if your site is located in Massachusetts (Table G-9), and your buffer vegetation corresponds most closely with that of tall fescue grass, and the soil type at your site is best typified as sand, your site's sediment removal efficiency would be 81 percent.

In this step, you should choose the vegetation type in the tables that most closely matches the vegetation that would exist naturally in the buffer area on your site regardless of the condition of the buffer. However, because you are not required to plant any additional vegetation in the buffer area, in determining what controls are necessary to meet this sediment removal equivalency in Step 2 below, you will be able to take credit for this area as a fully vegetated "natural buffer."

Similarly, if a portion of the buffer area adjacent to the water of the U.S. is owned by another party and is not under your control, you can treat the area of land not under your control as having the equivalent vegetative cover and soil type that predominates on the portion of the property on which your construction activities are occurring.

> *For example, if your earth-disturbances occur within 50 feet of a water of the U.S., but the 10 feet of land immediately adjacent to the water of the U.S. is owned by a different party than the land on which your construction activities are taking place and you do not have control over that land, you can treat the 10 foot area adjacent to the stream as having the equivalent soil and vegetation type that predominates in the 40 foot area under your control. You would then make the same assumption in Step 2 for purposes of determining the equivalent sediment removal.*

Alternatively, you may do your own calculation of the effectiveness of the 50-foot buffer based upon your site-specific conditions, and may use this number as your sediment removal equivalency standard to meet instead of using Tables G-8 through G-15. This calculation must be documented in your SWPPP.

Step 2 - Design Controls That Match the Sediment Removal Efficiency of the 50-foot Buffer

Once you determine the estimated sediment removal efficiency of a 50-foot buffer for your site in Step 1, you must next select stormwater controls that will provide an equivalent sediment load reduction. These controls can include the installation of a single control, such as a sediment pond or additional perimeter controls, or a combination of stormwater controls. Whichever control(s) you select, you must demonstrate in your SWPPP that the controls will provide at a minimum the same sediment removal capabilities as a 50-foot natural buffer (Step 1). You may take credit for the removal efficiencies of your required perimeter controls in your calculation of equivalency, because these were included in calculating the buffer removal efficiencies in Tables G-8 through G-15. (Note: You are reminded that the controls must be kept in effective operating condition until you complete final stabilization on the disturbed portions of the site discharging to the water of the U.S.)

- It was assumed that vegetation has been removed from the disturbed portion of the site and a combination of cuts and fills have resulted in a smooth soil surface with limited retention of near-surface root mass.

To represent the influence of soil, EPA analyzed 11 general soil texture classifications in its evaluation of buffer performance. To represent different types of buffer vegetation, EPA evaluated 4 or more common vegetative types for each state/territory covered under the permit. For each vegetation type evaluated, EPA considered only permanent, non-grazed, and non-harvested vegetation, on the assumption that a natural buffer adjacent to the water of the U.S. will typically be undisturbed. EPA also evaluated slope steepness and found that sediment removal efficiencies present in Tables G-8 through G-15 are achievable for slopes that are less than nine percent.

To make the determination that your controls and/or buffer area achieve an equivalent sediment load reduction as a 50-foot buffer, you should use a model or other type of calculation. As mentioned above, there are a variety of models available that can be used to support your calculation, including USDA's RUSLE-series programs and the WEPP erosion model, SEDCAD, SEDIMOT, or other models. A couple of examples are provided in Attachment 3 to help illustrate how this determination could be made.

If you retain a buffer of less than 50 feet, you may take credit for the removal that will occur from the reduced buffer and only need to provide additional controls to make up the difference between the removal efficiency of a 50 foot buffer and the removal efficiency of the narrower buffer. For example, if you retain a 30 foot buffer, you can account for the sediment removal provided by the 30 foot buffer retained, and you will only need to design controls to make up for the additional removal provided by the 20 feet of buffer that is not being provided. To do this, you would plug the width of the buffer that is retained into RUSLE or another model, along with other stormwater controls that will together achieve a sediment reduction equivalent to a natural 50-foot buffer.

As described in Step 1 above, you can take credit for the area you retained as a "natural buffer" as being fully vegetated, regardless of the condition of the buffer area.

> *For example, if your earth-disturbances occur 30 feet from a water of the U.S., but the 10 feet of land immediately adjacent to the water of the U.S. is owned by a different party than the land on which your construction activities are taking place and you do not have control over that land, you can treat the 10-foot area as a natural buffer, regardless of the activities that are taking place in the area. Therefore, you can assume (for purposes of your equivalency calculation) that your site is providing the sediment removal equivalent of a 30-foot buffer, and you will only need to design controls to make up for the additional removal provided by the 20-foot of buffer that is not being provided.*

Step 3 - Document How Site-Specific Controls Will Achieve the Sediment Removal Efficiency of the 50-foot Buffer

In Steps 1 and 2, you determined both the expected sediment removal efficiency of a 50-foot buffer at your site, and you used this number as a performance standard to design controls to be installed at your site, which alone or in combination with any retained natural buffer, achieves the expected sediment removal efficiency of a 50-foot buffer at your site. The final step is to document in your SWPPP the information you relied on to calculate the equivalent sediment reduction as an undisturbed natural buffer.

EPA will consider your documentation to be sufficient if it generally meets the following:

- For Step 1, refer to the table in Attachment 1 that you used to derive your estimated 50-foot buffer sediment removal efficiency performance. Include information about the buffer vegetation and soil type that predominate at your site, which you used to select the sediment load reduction value in Tables G-8 through G-15. Or, if you conducted a site-specific calculation for sediment removal efficiency, provide the specific removal efficiency, and the information you relied on to make your site-specific calculation.
- For Step 2, (1) Specify the model you used to estimate sediment load reductions from your site; and (2) the results of calculations showing how your controls will meet or exceed the sediment removal efficiency from Step 1.

If you choose compliance alternative 3, you must also include in your SWPPP a description of why it is infeasible for you to provide and maintain an undisturbed natural buffer of any size.

G.3 SMALL RESIDENTIAL LOT COMPLIANCE ALTERNATIVES

EPA has developed two additional compliance alternatives applicable only to "small residential lots" that are unable to provide and maintain a 50 foot buffer.

A **small residential lot** is a lot or grouping of lots being developed for residential purposes that will disturb less than 1 acre of land, but that is part of a larger residential project that will ultimately disturb greater than or equal to 1 acre.

The following steps describe how a small residential lot operator would achieve compliance with one these 2 alternatives.

G.3.1 Small Residential Lot Compliance Alternative Eligibility

In order to be eligible for the small residential lot compliance alternatives, the following conditions must be met:

a. The lot or grouping of lots meets the definition of "small residential lot"; and

b. The operator must follow the guidance for providing and maintaining a natural buffer in Part G.2.3 of this Appendix, including:

i. Ensure that all discharges from the area of earth disturbance to the natural buffer are first treated by the site's erosion and sediment controls, and use velocity dissipation devices if necessary to prevent erosion caused by stormwater within the buffer;

ii. Document in the SWPPP the natural buffer width retained on the property, and show the buffer boundary on your site plan; and

iii. Delineate, and clearly mark off, with flags, tape, or other similar marking device, all natural buffer areas.

G.3.2 Small Residential Lot Compliance Alternatives

You must next choose from one of two small residential lot compliance alternatives and implement the stormwater control practices associated with that alternative.

Note: The compliance alternatives provided below are not mandatory. Operators of small residential lots can alternatively choose to comply with the any of the options that are available to other sites in Part 2.2.1.a and G.2.1 of this Appendix.

Small Residential Lot Compliance Alternative 1

Alternative 1 is a straightforward tiered-technology approach that specifies the controls that a small residential lot must implement based on the buffer width retained. To meet the requirements of small residential lot compliance alternative 1, you must implement the controls specified in Table G-1 based on the buffer width to be retained. See footnote 3, below, for a description of the controls you must implement.

For example, if you are an operator of a small residential lot that will be retaining a 35-foot buffer and you choose Small Residential Lot Compliance Alternative 1, you must implement double perimeter controls between earth disturbances and the water of the U.S.

In addition to implementing the applicable control, you must also document in your SWPPP how you will comply with small residential lot compliance alternative 1.

Table G-1 Alternative 1 Requirements[2]

Retain 50-foot Buffer	Retain <50 and >30 foot Buffer	Retain ≤ 30 foot Buffer
No Additional Requirements	Double Perimeter Controls	Double Perimeter Controls and 7-Day Site Stabilization

Small Residential Lot Compliance Alternative 2

Alternative 2 specifies the controls that a builder of a small residential lot must implement based on both the buffer width retained and the site's sediment discharge risk. By incorporating the sediment risk, this approach may result in the implementation of controls that are more appropriate for the site's specific conditions.

Step 1 – Determine Your Site's Sediment Risk Level

To meet the requirements of Alternative 2, you must first determine your site's sediment discharge "risk level" based on the site's slope, location, and soil type. To help you to determine your site's sediment risk level, EPA developed five different tables for different slope conditions. You should select the table that most closely corresponds to your site's average slope.

For example, if your site's average slope is 7 percent, you should use Table G-4 to determine your site's sediment risk.

After you determine which table applies to your site, you must then use the table to determine the "risk level" (e.g., "low", "moderate", or "high") that corresponds to your site's location and predominant soil type.[3]

For example, based on Table G-3, a site located in New Hampshire with a 4 percent average slope and with predominately sandy clay loam soils would fall into the "moderate" risk level.

[2] **Description of Additional Controls Applicable to Small Residential Lot Compliance Alternatives 1 and 2:**

- **No Additional Requirements:** If you implement a buffer of 50 feet or greater, then you are not subject to any additional requirements. Note that you are required to install perimeter controls between the disturbed portions of your site and the buffer in accordance with Part 2.2.3.
- **Double Perimeter Control:** In addition to the reduced buffer width retained on your site, you must provide a double row of perimeter controls between the disturbed portion of your site and the water of the U.S. spaced a minimum of 5 feet apart.
- **Double Perimeter Control and 7-Day Site Stabilization:** In addition to the reduced buffer width retained on your site and the perimeter control implemented in accordance with Part 2.2.3, you must provide a double row of perimeter controls between the disturbed portion of your site and the water of the U.S. spaced a minimum of 5 feet apart, and you are required to complete the stabilization activities specified in Parts 2.2.14 within 7 calendar days of the temporary or permanent cessation of earth-disturbing activities.

[3] One source for determining your site's predominant soil type is the USDA's Web Soil Survey located at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Table G-2 Risk Levels for Sites with Average Slopes of ≤ 3 Percent

Soil Type / Location	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
CNMI / Guam	Moderate	Moderate	Moderate	Moderate	High
Puerto Rico	Moderate	Moderate	Moderate	Moderate	High
Virgin Islands	Low	Moderate	Low	Moderate	Moderate
American Samoa	Moderate	Moderate	Moderate	Moderate	High
Massachusetts and New Hampshire	Low	Moderate	Low	Low	Moderate
Idaho	Low	Low	Low	Low	Low
New Mexico	Low	Low	Low	Low	Low
Washington D.C.	Low	Moderate	Low	Low	Moderate

Table G-3 Risk Levels for Sites with Average Slopes of > 3 Percent and ≤ 6 Percent

Soil Type / Location	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
CNMI / Guam	Moderate	Moderate	Moderate	Moderate	High
Puerto Rico	Moderate	Moderate	Moderate	Moderate	High
Virgin Islands	Moderate	Moderate	Moderate	Moderate	High
American Samoa	High	High	Moderate	High	High
Massachusetts and New Hampshire	Moderate	Moderate	Low	Moderate	High
Idaho	Low	Low	Low	Low	Low
New Mexico	Low	Low	Low	Low	Moderate
Washington D.C.	Moderate	Moderate	Moderate	Moderate	High

Table G-4 Risk Levels for Sites with Average Slopes of > 6 Percent and ≤ 9 Percent

Soil Type / Location	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
CNMI / Guam	Moderate	High	Moderate	High	High
Puerto Rico	Moderate	High	Moderate	Moderate	High
Virgin Islands	Moderate	Moderate	Moderate	Moderate	High
American Samoa	High	High	High	High	High
Massachusetts and New Hampshire	Moderate	Moderate	Moderate	Moderate	High
Idaho	Low	Low	Low	Low	Low
New Mexico	Low	Low	Low	Low	Moderate
Washington D.C.	Moderate	Moderate	Moderate	Moderate	High

Table G-5 Risk Levels for Sites with Average Slopes of > 9 Percent and ≤ 15 Percent

Soil Type / Location	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
CNMI / Guam	High	High	High	High	High
Puerto Rico	High	High	High	High	High
Virgin Islands	Moderate	High	Moderate	High	High
American Samoa	High	High	High	High	High
Massachusetts and New Hampshire	Moderate	Moderate	Moderate	Moderate	High
Idaho	Low	Low	Low	Low	Low
New Mexico	Low	Moderate	Low	Moderate	Moderate
Washington D.C.	Moderate	High	Moderate	Moderate	High

Table G-6 Risk Levels for Sites with Average Slopes of > 15 Percent

Soil Type / Location	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
CNMI / Guam	High	High	High	High	High
Puerto Rico	High	High	High	High	High
Virgin Islands	High	High	High	High	High
American Samoa	High	High	High	High	High
Massachusetts and New Hampshire	High	High	Moderate	High	High
Idaho	Low	Low	Low	Low	Moderate
New Mexico	Moderate	Moderate	Moderate	Moderate	High
Washington D.C.	High	High	Moderate	High	High

Step 2 – Determine Which Additional Controls Apply

Once you determine your site's "risk level", you must next determine the additional controls you need to implement on your site, based on the width of buffer you plan to retain. Table G-7 specifies the requirements that apply based on the "risk level" and buffer width retained. See footnote 3, above, for a description of the additional controls that are required.

For example, if you are the operator of a small residential lot that falls into the "moderate" risk level, and you decide to retain a 20-foot buffer, using Table G-7 you would determine that you need to implement double perimeter controls to achieve compliance with small residential lot compliance alternative 2.

You must also document in your SWPPP your compliance with small residential lot compliance alternative 2.

Table G-7. Alternative 2 Requirements[2]

Risk Level Based on Estimated Soil Erosion	Retain ≥ 50' Buffer	Retain <50' and >30' Buffer	Retain ≤30' and >10' Buffer	Retain ≤ 10' Buffer
Low Risk	No Additional Requirements	No Additional Requirements	Double Perimeter Control	Double Perimeter Control
Moderate Risk	No Additional Requirements	Double Perimeter Control	Double Perimeter Control	Double Perimeter Control and 7-Day Site Stabilization
High Risk	No Additional Requirements	Double Perimeter Control	Double Perimeter Control and 7-Day Site Stabilization	Double Perimeter Control and 7-Day Site Stabilization

ATTACHMENT 1

Sediment Removal Efficiency Tables[4]

EPA recognizes that very high removal efficiencies, even where theoretically achievable by a 50-foot buffer, may be very difficult to achieve in practice using alternative controls. Therefore in the tables below, EPA has limited the removal efficiencies to a maximum of 90%. Efficiencies that were calculated at greater than 90% are shown as 90%, and this is the minimum percent removal that must be achieved by alternative controls.

Table G-8 Estimated 50-foot Buffer Performance in Idaho*

	Estimated % Sediment Removal				
Type of Buffer Vegetation**	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Tall Fescue Grass	42	52	44	48	85
Medium-density Weeds	28	30	28	26	60
Low-density Warm-season Native Bunchgrass (i.e., Grama Grass)	25	26	24	24	55
Northern Mixed Prairie Grass	28	30	28	26	50
Northern Range Cold Desert Shrubs	28	28	24	26	50

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

Table G-9 Estimated 50-foot Buffer Performance in Massachusetts and New Hampshire*

	Estimated % Sediment Removal				
Type of Buffer Vegetation**	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Warm-season Grass (i.e., Switchgrass, Lemongrass)	79	90	90	90	90
Cool-season Dense Grass (Kentucky Bluegrass, Smooth Bromegrass, Timothy)	78	90	90	90	90
Tall Fescue Grass	76	90	81	89	90
Medium-density Weeds	66	76	60	72	66

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

[4] The buffer performances were calculated based on a denuded slope upgradient of a 50-foot buffer and a perimeter controls, as perimeter controls are a standard requirement (see Part 2.2.3).

Table G-10 Estimated 50-foot Buffer Performance in New Mexico*

	Estimated % Sediment Removal				
Type of Buffer Vegetation **	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Tall Fescue grass	71	85	80	86	90
Medium-density Weeds	56	73	55	66	78
Low-density Warm-season Native Bunchgrass (i.e., Grama Grass)	53	70	51	62	67
Southern Mixed Prairie Grass	53	71	52	63	50
Southern Range Cold Desert Shrubs	56	73	55	65	53

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

Table G-11 Estimated 50-foot Buffer Performance in Washington, DC*

	Estimated % Sediment Removal				
Type of Buffer Vegetation **	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Warm-season Grass (i.e., Switchgrass, Lemongrass)	82	90	90	90	90
Cool-season Dense Grass (Kentucky Bluegrass, Smooth Bromegrass, Timothy)	81	90	90	90	90
Tall Fescue Grass	79	90	83	89	90
Medium-density Weeds	71	79	66	75	74

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

Table G-12 Estimated 50-foot Buffer Performance in American Samoa*

	Estimated % Sediment Removal				
Type of Buffer Vegetation **	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Bahiagrass (Permanent cover)	82	90	90	90	83
Warm-season Grass (i.e., Switchgrass, Lemongrass)	82	90	90	90	85
Dense Grass	82	90	90	90	83
Tall Fescue Grass	82	89	82	89	79
Medium-density Weeds	70	73	62	75	59

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

Table G-13 Estimated 50-foot Buffer Performance in CNMI and Guam*

	Estimated % Sediment Removal				
Type of Buffer Vegetation **	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Bahiagrass (Permanent cover)	80	90	90	90	89
Warm-season Grass (i.e., Switchgrass, Lemongrass)	80	90	90	90	90
Dense Grass	79	90	90	90	89
Tall Fescue Grass	76	90	80	88	87
Medium-density Weeds	63	73	53	68	61

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

Table G-14 Estimated 50-foot Buffer Performance in Puerto Rico*

	Estimated % Sediment Removal				
Type of Buffer Vegetation**	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Bahiagrass (Permanent cover)	83	90	90	90	90
Warm-season Grass (i.e., Switchgrass, Lemongrass)	83	90	90	90	90
Dense Grass	83	90	90	90	90
Tall Fescue Grass	82	90	84	90	89
Medium-density Weeds	72	78	65	76	64

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

Table G-15 Estimated 50-foot Buffer Performance in Virgin Islands*

Type of Buffer Vegetation**	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Bahiagrass (Permanent cover)	85	90	90	90	90
Warm-season Grass (i.e., Switchgrass, Lemongrass)	86	90	90	90	90
Dense Grass	85	90	90	90	90
Tall Fescue Grass	85	90	88	90	89
Medium-density Weeds	75	77	71	78	63

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

ATTACHMENT 2

Using the Sediment Removal Efficiency Tables – Questions and Answers

- *What if my specific buffer vegetation is not represented in Tables G-8 through G-15?* Tables G - 8 through G - 15 provide a wide range of factors affecting buffer performance; however, there are likely instances where the specific buffer vegetation type on your site is not listed. If you do not see a description of the type of vegetation present at your site, you should choose the vegetation type that most closely matches the vegetation type on your site. You can contact your local Cooperative Extension Service Office (http://nifa.usda.gov/partners-and-extension-map) for assistance in determining the vegetation type in Tables G-8 through G-15 that most closely matches your site-specific vegetation.
- *What if there is high variability in local soils?* EPA recognizes that there may be a number of different soil type(s) on any given construction site. General soil information can be obtained from USDA soil survey reports (http://websoilsurvey.nrcs.usda.gov) or from individual site assessments performed by a certified soil expert. Tables G-8 through G-15 present eleven generic soil texture classes, grouping individual textures where EPA has determined that performance is similar. If your site contains different soil texture classes, you should use the soil type that best approximates the predominant soil type at your site.
- *What if my site slope is greater than 9 percent after final grade is reached?* As indicated in the buffer performance tables, the estimated sediment removal efficiencies are associated with disturbed slopes of up to 9 percent grade. Where your graded site has an average slope of greater than 9 percent, you should calculate a site-specific buffer performance.
- *How do I calculate my own estimates for sediment reduction at my specific site?* If you determine that it is necessary to calculate your own sediment removal efficiency using site-specific conditions (e.g., slopes at your site are greater than 9 percent), you can use a range of available models that are available to facilitate this calculation, including USDA's RUSLE-series programs and the WEPP erosion model, SEDCAD, SEDIMOT, or other equivalent models.
- *What is my estimated buffer performance if my site location is not represented by Tables G-8 through G-15?* If your site is located in an area not represented by Tables G-8 through G-15, you should use the table that most closely approximates conditions at your site. You may instead choose to conduct a site-specific calculation of the buffer performance.
- *What if only a portion of my site drains to the buffer area?* If only a portion of your site drains to a water of the U.S., where that water is within 50 feet of your earth disturbances, you are only required to meet the equivalency requirement for the stormwater flows corresponding to those portions of the site. See Example 2 below for an example of how this is expected to work.

ATTACHMENT 3

Examples of How to Use the Sediment Removal Efficiency Tables

Example 1. Comparatively Wet Location (7.5 acre site located in Massachusetts)

The operator of a 7.5-acre construction site in Massachusetts has determined that it is infeasible to establish a buffer of any size on the site, and is now required to select and install controls that will achieve an equivalent sediment load reduction as that estimated in G-9 for their site conditions. The first step is to identify what percentage of eroded sediment is estimated to be retained from a 50-foot buffer. For this example, it is assumed that the site has a relatively uniform gentle slope (3 percent), so Table G-9 can be used to estimate the 50-foot buffer sediment load reduction. If the site's buffer vegetation is best typified by cool-season dense grass and the underlying soil is of a type best described as loamy sand, the 50-foot buffer is projected to capture 90 percent of eroded sediment from the construction site.

The second step is to determine what sediment controls can be selected and installed in combination with the perimeter controls already required to be implemented at the site (see Part 2.2.3), which will achieve the 90 percent sediment removal efficiency from Table G-9. For this example, using the RUSLE2 profile model, it was determined that installing a pair of shallow-sloped diversion ditches to convey runoff to a well-designed and maintained sediment basin provides 99 percent sediment removal. Because the estimated sediment reduction is greater than the required 90 percent that a 50-foot buffer provides, the operator will have met the buffer requirements. See Figure G-5. The operator could also choose a different set of controls, as long as they achieve at least a 90 percent sediment removal efficiency.

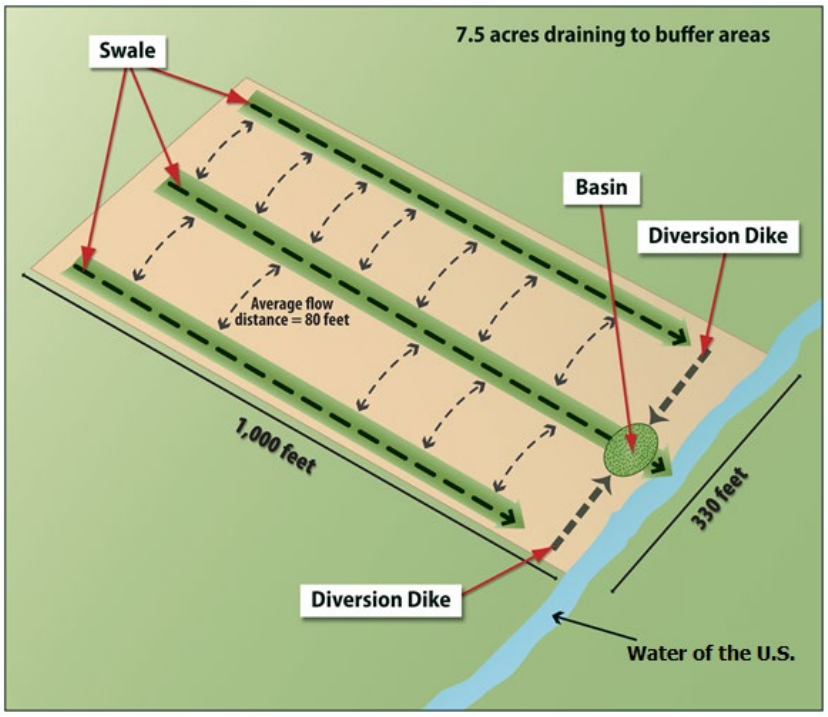


Figure G-5 Example 1 – Equivalent Sediment Load Reductions at a 7.5 ac Site in MA.

Example 2. Arid Location With Pre-existing Disturbances in the Natural Buffer (6.5 acre site located in New Mexico)

An operator of a site in New Mexico determines that it is not feasible to provide a 50-foot buffer, but a 28-foot buffer can be provided. Because the operator will provide a buffer that is less than

50 feet, the operator must determine which controls, in combination with the 28-foot buffer, achieve a sediment load reduction equivalent to the 50-foot buffer. In this example, the project will disturb 6.5 acres of land, but only 1.5 acres of the total disturbed area drains to the buffer area. Within the 28-foot buffer area is a preexisting concrete walkway. Similar to Example 1, the equivalence analysis starts with Step 1in Part G.2.4 of this Appendix with a review of the New Mexico buffer performance (Table G-10). The operator determines that the predominate vegetation type in the buffer area is prairie grass, the soil type is similar to silt, and the site is of a uniform, shallow slope (e.g., 3 percent grade). Although the operator will take credit for the disturbance caused by the concrete walkway as a natural buffer in Step 2, here the operator can treat the entire buffer area as being naturally vegetated with prairie grass. Based on this information, the operator refers to Table G-10 to estimate that the 50-foot buffer would retain 50 percent of eroded soil.

The second step is to determine, based on the 50 percent sediment removal efficiency found in Table G-10, what sediment controls, in combination with the 28-foot buffer area, can be implemented to reduce sediment loads by 50 percent or more. The operator does not have to account the reduction in buffer function caused by the preexisting walkway, and can take credit for the entire 28-foot buffer being fully vegetated in the analysis. For this example, using the RUSLE2 profile model, the operator determined that installing a fiber roll barrier between the silt fence (already required by Part 2.2.3) and the 28-foot buffer will achieve an estimated 84 percent sediment removal efficiency. See Figure G-6. Note that this operator is subject to the requirement in Part G.2.3 of this Appendix to ensure that discharges through the silt fence, fiber roll barrier, and 28-foot buffer do not cause erosion within the buffer. The estimated sediment reduction is greater than the required 50 percent; therefore the operator will have met the buffer alternative requirement.

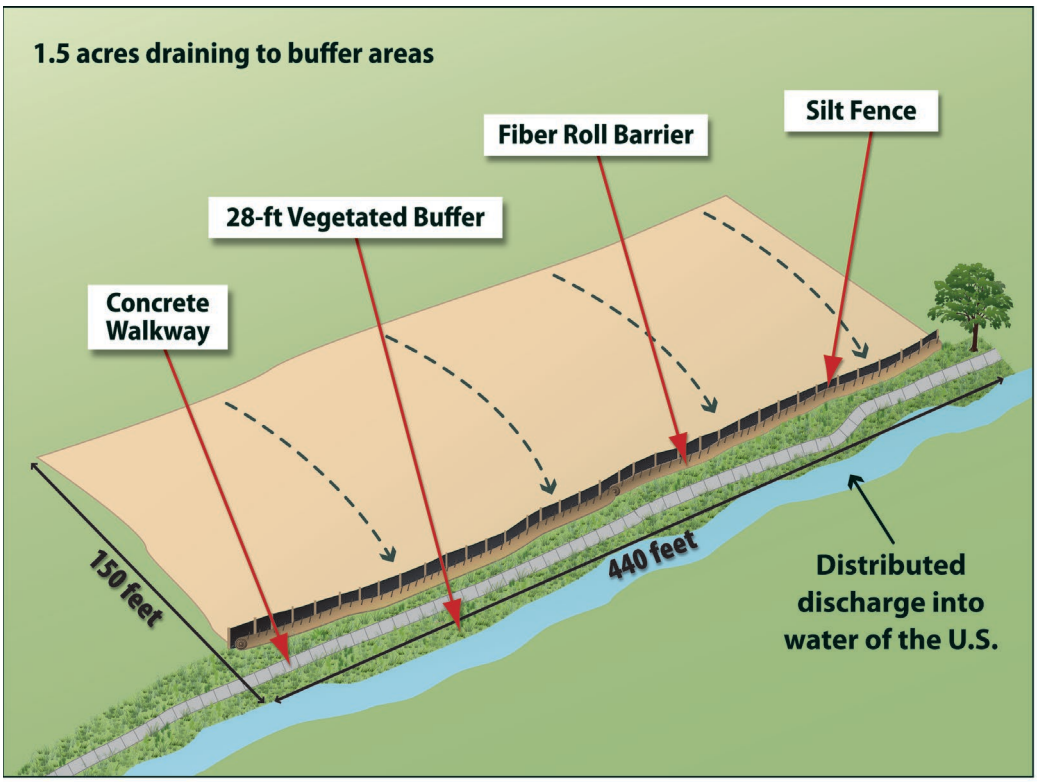


Figure G-6 Example 2 – Equivalent Sediment Load Reductions at a 6.5 ac Site in NM.

Appendix H – 2-Year, 24-Hour Storm Frequencies

Part 2.2.12 of the permit indicates that if you install a sediment basin, one of the design requirements is to provide storage for either (1) the calculated volume of runoff from a 2-year, 24-hour storm, or (2) 3,600 cubic feet per acre drained. This appendix is intended to provide a guide to permittees to determine the volume of precipitation associated with their local 2-year, 24-hour storm event.

The permittee should start out by determining their local 2-year, 24-hour storm volume. The rainfall frequency atlases, technical papers, and the Precipitation Frequency Data Server (PFDS) developed by the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) serve as national standards for rainfall intensity at specified frequencies and durations in the United States. Table H-1 identifies methods for determining precipitation frequency based on permit area. EPA notes that permittees may also use alternative peer-reviewed data sources not listed in Table H - 1 to determine the 2-year, 24-hour storm for their site.

Table H -1 – Method to Determine Precipitation Frequency Based on Permit Area

PERMIT AREA	METHOD TO DETERMINE PRECIPITATION FREQUENCY
District of Columbia	PFDS; NOAA Atlas 14, Vol. 2
Idaho	NOAA Atlas 2, Vol. 5; Technical Paper 40
Massachusetts	Technical Paper 40
New Hampshire	Technical Paper 40
New Mexico	PFDS; Technical Paper 40
Selected Pacific Islands	PFDS; Technical Paper 40
Puerto Rico and the U.S Virgin Islands	PFDS; Technical Paper 40
Other	PFDS; Technical Paper 40; NOAA Atlas 2 or 14

How to Determine Your Local 2-year, 24-hour Storm Size

Projects located in the **District of Columbia, Massachusetts, New Hampshire, New Mexico, Puerto Rico, U.S. Virgin Islands, or Pacific Island**s can use the PFDS at http://hdsc.nws.noaa.gov/hdsc/pfds/index.html or the appropriate NOAA's Atlas 14 Volume at http://www.nws.noaa.gov/oh/hdsc/currentpf.htm to determine their precipitation frequency.

The PFDS is an easy to use, point-and-click interface to official U.S. precipitation frequency estimates and intensities. The opening PFDS screen is a clickable map of the United States. Upon clicking on a state, a state-specific interface appears. From this page the user selects the following:

- A location: Either via clicking on the map or manually entering a longitude/latitude coordinate;
- Data type: precipitation depth or precipitation intensity
- Units: english or metric; and
- Time series type: partial duration or annual maximum.

Additionally, PFDS also serves as a tool for providing references and other information for other current precipitation frequency standards that are not yet updated.

Projects located in **Idaho** can use the NOAA Atlas 2, Vol. 5 to determine their precipitation frequency. NOTE: Precipitation Frequencies on the NOAA Atlas 2, Vol. 5 are in tenths of an inch and will have to be converted to inches to determine precipitation frequency. NOAA Atlas 2, Vol. 5 can be accessed at http://www.nws.noaa.gov/oh/hdsc/PF_documents/Atlas2_Volume5.pdf. (See also attached map of NOAA Atlas 2, Vol. 5)

Projects located in areas not covered by the PFDS or NOAA Atlases will need to use TP-40 to identify the precipitation frequency. TP-40 provides a map of the continental U.S. for the 2-year, 24-hour rainfall. TP40 can be accessed at http://www.nws.noaa.gov/oh/hdsc/PF_documents/TechnicalPaper_No40.pdf. (See also attached map of TP-40)

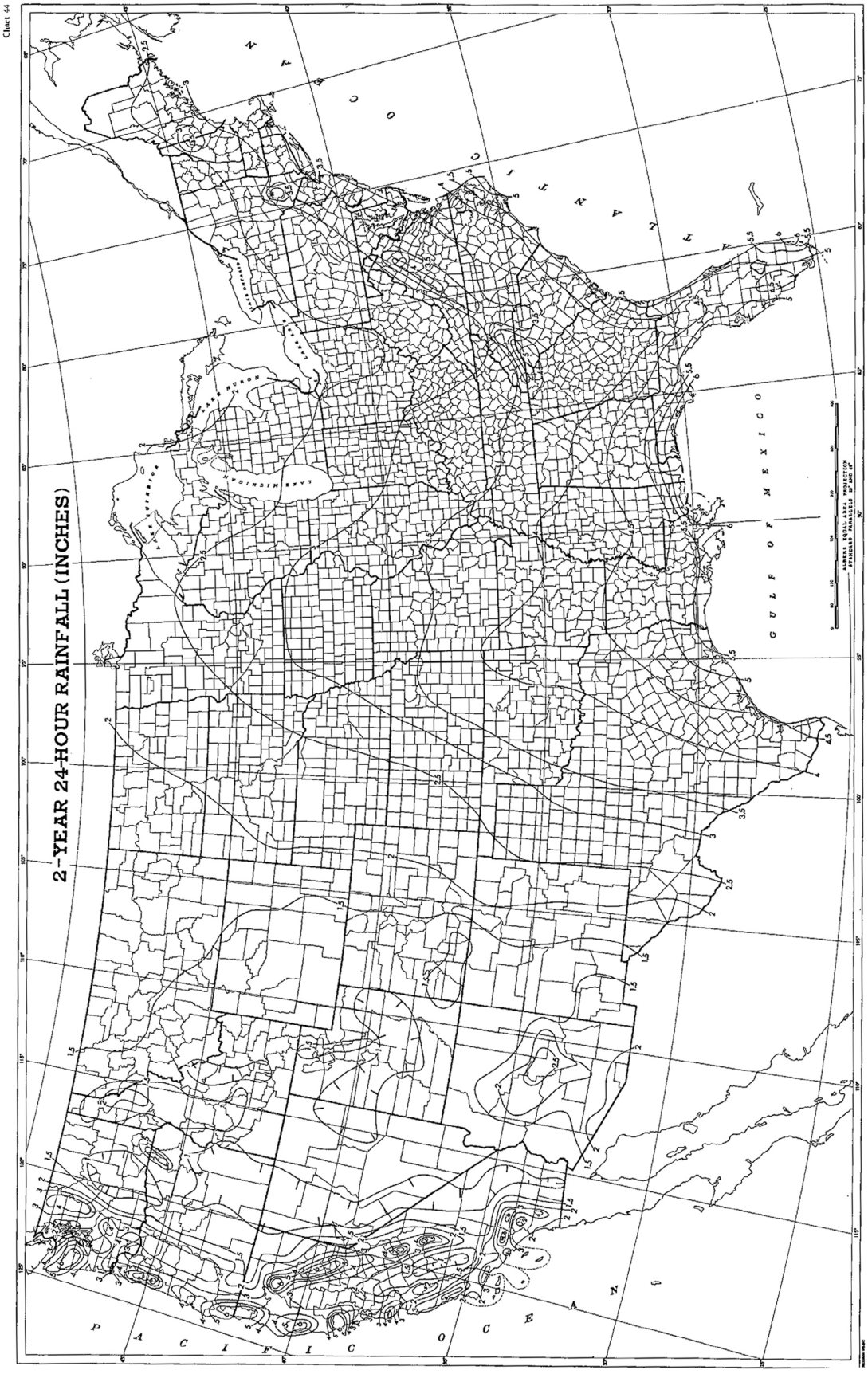
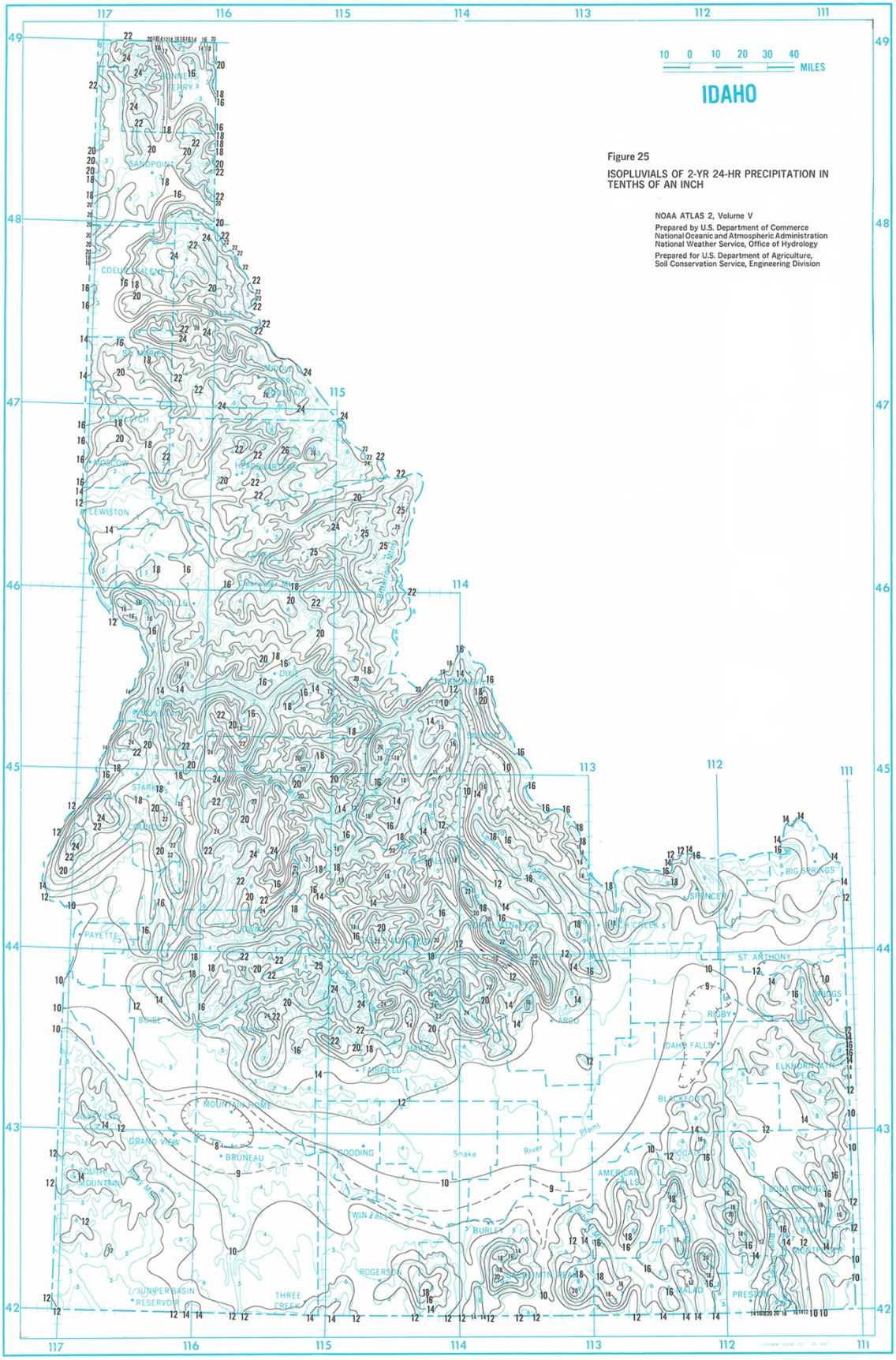


Chart 44
2-YEAR 24-HOUR RAINFALL (INCHES)
GULF OF MEXICO
PACIFIC OCEAN


10 0 10 20 30 40
MILES
IDAHO
Figure 25
ISOPLUVIALS OF 2-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH
NOAA ATLAS 2, Volume V
Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology
Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

Appendix I - Standard Permit Conditions

Standard permit conditions in Appendix I are consistent with the general permit provisions required under 40 CFR 122.41.

I.1 Duty To Comply.

You must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

I.1.1 You must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish these standards, even if the permit has not yet been modified to incorporate the requirement.

I.1.2 Penalties for Violations of Permit Conditions: The Director will adjust the civil and administrative penalties listed below in accordance with the Civil Monetary Penalty Inflation Adjustment Rule (61 FR 252, December 31, 1996, pp. 69359-69366, as corrected in 62 FR 54, March 20, 1997, pp.13514-13517) as mandated by the Debt Collection Improvement Act of 1996 for inflation on a periodic basis. This rule allows EPA's penalties to keep pace with inflation. The Agency is required to review its penalties at least once every 4 years thereafter and to adjust them as necessary for inflation according to a specified formula. The civil and administrative penalties following were adjusted for inflation starting in 1996.

I.1.2.1 *Criminal Penalties.*

a. *Negligent Violations*. The CWA provides that any person who negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to criminal penalties of not less than $2,500 nor more than $25,000 per day of violation, or imprisonment of not more than one year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation or by imprisonment of not more than two years, or both.

b. *Knowing Violations.* The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

c. *Knowing Endangerment.* The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act and who knows at that time that he or she is placing another person in imminent danger of death or serious bodily injury shall upon conviction be subject to a fine of not more than $250,000 or by imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision be subject to a fine of not

more than $1,000,000 and can fined up to $2,000,000 for second or subsequent convictions.

d. *False Statement.* The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. The Act further provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

I.1.2.2 *Civil Penalties.* The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed the maximum amount authorized by Section 309(d) of the Act, as adjusted pursuant to the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended (28 U.S.C. § 2461 note), and codified at 40 CFR § 19.4.

I.1.2.3 *Administrative Penalties.* The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty, as follows

a. *Class I Penalty.* Not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act, as adjusted pursuant to the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note), as amended (28 U.S.C. § 2461 note), and codified at 40 CFR § 19.4.

b. *Class II Penalty.* Not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act, as adjusted pursuant to the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note), as amended, (28 U.S.C. § 2461 note), and codified at 40 CFR § 19.4.

I.2 Duty to Reapply.

If you wish to continue an activity regulated by this permit after the expiration date of this permit, you must apply for and obtain authorization as required by the new permit once EPA issues it.

I.3 Need to Halt or Reduce Activity Not a Defense.

It shall not be a defense for you in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

I.4 Duty to Mitigate.

You must take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

I.5 Proper Operation and Maintenance.

You must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by you to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by you only when the operation is necessary to achieve compliance with the conditions of this permit.

I.6 Permit Actions.

This permit may be modified, revoked and reissued, or terminated for cause. Your filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

I.7 Property Rights.

This permit does not convey any property rights of any sort, or any exclusive privileges.

I.8 Duty to Provide Information.

You must furnish to EPA or an authorized representative (including an authorized contractor acting as a representative of EPA), within a reasonable time, any information that EPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. You must also furnish to EPA or an authorized representative upon request, copies of records required to be kept by this permit.

I.9 Inspection and Entry.

You must allow EPA or an authorized representative (including an authorized contractor acting as a representative of EPA), upon presentation of credentials and other documents as may be required by law, to:

I.9.1 Enter upon your premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

I.9.2 Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

I.9.3 Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

I.9.4 Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

I.10 Monitoring and Records.

I.10.1 Samples and measurements taken for the purpose of monitoring must be representative of the volume and nature of the monitored activity.

I.10.2 You must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date the permit expires or the date the permittee's authorization is terminated. This period may be extended by request of EPA at any time.

I.10.3 Records of monitoring information must include:

I.10.3.1 The date, exact place, and time of sampling or measurements;

I.10.3.2 The individual(s) who performed the sampling or measurements;

I.10.3.3 The date(s) analyses were performed

I.10.3.4 The individual(s) who performed the analyses;

I.10.3.5 The analytical techniques or methods used; and

I.10.3.6 The results of such analyses.

I.10.4 Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in the permit.

I.10.5 The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

I.11 Signatory Requirements.

I.11.1 All applications, including NOIs, must be signed as follows:

I.11.1.1 For a corporation: By a responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

I.11.1.2 For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

I.11.1.3 For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

I.11.2 Your SWPPP, including changes to your SWPPP, inspection reports, and any other compliance documentation required under this permit, must be signed by a person described in Appendix I, Subsection I.11.1 above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

I.11.2.1 The authorization is made in writing by a person described in Appendix I, Subsection I.11.1;

I.11.2.2 The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and

I.11.2.3 The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

I.11.3 Changes to Authorization. If an authorization under this permit is no longer accurate because a different operator has responsibility for the overall operation of the construction site, a new NOI must be submitted to EPA. See Table 1 in Part 1.4.2 of the permit. However, if the only change that is occurring is a change in contact information or a change in the facility's address, the operator need only make a modification to the existing NOI submitted for authorization.

I.11.4 Any person signing documents in accordance with Appendix I, Subsections I.11.1 or I.11.2 above must include the following certification:

> "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information contained therein. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information contained is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

I.11.5 For persons signing NOIs electronically, in addition to meeting other applicable requirements in Appendix I, Subsection I.11, such signatures must meet the same signature, authentication, and identity-proofing standards set forth at 40 CFR § 3.2000(b) for electronic reports (including robust second-factor authentication).

I.11.6 The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

I.12 Reporting Requirements.

I.12.1 Planned changes. You must give notice to EPA as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

I.12.1.1 The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or

I.12.1.2 The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).

I.12.2 Anticipated noncompliance. You must give advance notice to EPA of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

I.12.3 Transfers. This permit is not transferable to any person except after notice to EPA. Where a facility wants to change the name of the permittee, the original permittee (the first owner or operators) must submit a Notice of Termination pursuant to Part 8. The new owner or operator must submit a Notice of Intent in accordance with Part 1.7 and Table 1. See also requirements in Appendix I, Subsections I.11.1 and I.11.2.

I.12.4 Monitoring reports. Monitoring results must be reported at the intervals specified elsewhere in this permit.

I.12.4.1 Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by EPA for reporting results of monitoring of sludge use or disposal practices.

I.12.4.2 If you monitor any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of this monitoring must be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by EPA.

I.12.5 Compliance schedules. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.

I.12.6 Twenty-four hour reporting. In addition to reports required elsewhere in this permit:

I.12.6.1 You must report any noncompliance which may endanger health or the environment directly to the EPA Regional Office (see contacts at https://www2.epa.gov/national-pollutant-discharge-elimination-system-npdes/contact-us-stormwater#regional). Any information must be provided orally within 24 hours from the time you become aware of the circumstances. A written submission must also be provided within five days of the time you become aware of the circumstances. The written submission must contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

I.12.6.2 The following shall be included as information which must be reported within 24 hours under this paragraph.

a. Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR 122.41(m)(3)(ii))

b. Any upset which exceeds any effluent limitation in the permit

c. Violation of a maximum daily discharge limit for any numeric effluent limitation. (See 40 CFR 122.44(g).)

I.12.6.3 EPA may waive the written report on a case-by-case basis for reports under Appendix I, Subsection I.12.6.2 if the oral report has been received within 24 hours.

I.12.7 Other noncompliance. You must report all instances of noncompliance not reported under Appendix I, Subsections I.12.4, I.12.5, and I.12.6, at the time monitoring reports are submitted. The reports must contain the information listed in Appendix I, Subsection I.12.6.

I.12.8 Other information. Where you become aware that you failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application

or in any report to the Permitting Authority, you must promptly submit such facts or information.

I.13 Bypass.

I.13.1 Definitions.

I.13.1.1 Bypass means the intentional diversion of waste streams from any portion of a treatment facility See 40 CFR 122.41(m)(1)(i).

I.13.1.2 Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. See 40 CFR 122.41(m)(1)(ii).

I.13.2 Bypass not exceeding limitations. You may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Appendix I, Subsections I.13.3 and I.13.4. See 40 CFR 122.41(m)(2).

I.13.3 Notice.

I.13.3.1 Anticipated bypass. If you know in advance of the need for a bypass, you must submit prior notice, if possible at least ten days before the date of the bypass. See 40 CFR 122.41(m)(3)(i).

I.13.3.2 Unanticipated bypass. You must submit notice of an unanticipated bypass as required in Appendix I, Subsection I.12.6 (24-hour notice). See 40 CFR 122.41(m)(3)(ii).

I.13.4 Prohibition of bypass. See 40 CFR 122.41(m)(4).

I.13.4.1 Bypass is prohibited, and EPA may take enforcement action against you for bypass, unless:

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

c. You submitted notices as required under Appendix I, Subsection I.13.3.

I.13.4.2 EPA may approve an anticipated bypass, after considering its adverse effects, if EPA determines that it will meet the three conditions listed above in Appendix I, Subsection I.13.4.1.

I.14 Upset.

I.14.1 Definition. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond your reasonable control. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. See 40 CFR 122.41(n)(1).

I.14.2 Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Appendix I, Subsection I.14.3 are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. See 40 CFR 122.41(n)(2).

I.14.3 Conditions necessary for a demonstration of upset. See 40 CFR 122.41(n)(3). A permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

I.14.3.1 An upset occurred and that you can identify the cause(s) of the upset;

I.14.3.2 The permitted facility was at the time being properly operated; and

I.14.3.3 You submitted notice of the upset as required in Appendix I, Subsection I.12.6.2.b (24 hour notice).

I.14.3.4 You complied with any remedial measures required under Appendix I, Subsection I.4.

I.14.4 Burden of proof. In any enforcement proceeding, you, as the one seeking to establish the occurrence of an upset, have the burden of proof. See 40 CFR 122.41(n)(4).

I.15 Retention of Records.

Copies of the SWPPP and all documentation required by this permit, including records of all data used to complete the NOI to be covered by this permit, must be retained for at least three years from the date that permit coverage expires or is terminated. This period may be extended by request of EPA at any time.

I.16 Reopener Clause.

I.16.1 Procedures for modification or revocation. Permit modification or revocation will be conducted according to 40 CFR §122.62, §122.63, §122.64 and §124.5.

I.16.2 Water quality protection. If there is evidence indicating that the stormwater discharges authorized by this permit cause, have the reasonable potential to cause or contribute to an excursion above any applicable water quality standard, you may be required to obtain an individual permit, or the permit may be modified to include different limitations and/or requirements.

I.16.3 Timing of permit modification. EPA may elect to modify the permit prior to its expiration (rather than waiting for the new permit cycle) to comply with any new statutory or regulatory requirements, such as for effluent limitation guidelines that may be promulgated in the course of the current permit cycle.

I.17 Severability.

Invalidation of a portion of this permit does not necessarily render the whole permit invalid. EPA's intent is that the permit is to remain in effect to the extent possible; in the event that any part of this permit is invalidated, EPA will advise the regulated community as to the effect of such invalidation.

Appendix J - Notice of Intent (NOI) Form and Instructions

Part 1.4.1 requires you to use the NPDES eReporting Tool, or "NeT" system, to prepare and submit your NOI electronically. However, if the EPA Regional Office grants you a waiver to use a paper NOI form, and you elect to use it, you must complete and submit the following form.

NPDES FORM 3510-9	EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WASHINGTON, DC 20460 NOTICE OF INTENT FOR THE 2017 NPDES CONSTRUCTION GENERAL PERMIT	Form Approved. OMB No. 2040-0004

Submission of this Notice of Intent (NOI) constitutes notice that the operator identified in Section III of this form requests authorization to discharge pursuant to the NPDES Construction General Permit (CGP) permit number identified in Section II of this form. Submission of this NOI also constitutes notice that the operator identified in Section III of this form meets the eligibility requirements of Part 1.1 CGP for the project identified in Section IV of this form. Permit coverage is required prior to commencement of construction activity until you are eligible to terminate coverage as detailed in Part 8 of the CGP. To obtain authorization, you must submit a complete and accurate NOI form. Discharges are not authorized if your NOI is incomplete or inaccurate or if you were never eligible for permit coverage. Refer to the instructions at the end of this form.

I. Approval to Use Paper NOI Form

Have you been granted a waiver from electronic reporting from the Regional Office *? ☐ YES ☐ NO

If yes, check which waiver you have been granted, , the name of the EPA Regional Office staff person who granted the waiver, and the date of approval:

Waiver granted:

☐ The owner/operator's headquarters is physically located in a geographic area (i.e., ZIP code or census tract) that is identified as under-served for broadband Internet access in the most recent report from the Federal Communications Commission.

☐ The owner/operator has issues regarding available computer access or computer capability.

Name of EPA staff person that granted the waiver:

Date approval obtained: / /

*** Note: You are required to obtain approval from the applicable Regional Office prior to using this paper NOI form. If you have not obtained a waiver, you must file this form electronically using the NPDES eReporting Tool (NeT).**

II. Permit Information

NPDES ID (EPA Use Only):

Master Permit Number: (see Appendix B of the CGP for the list of eligible permit numbers)

III. Operator Information

Operator Information

Operator Name:

Are you requesting coverage under this NOI as a "federal operator" as defined in Appendix A? ☐ YES ☐ NO

Mailing Address:

Street:

City: State: ZIP Code: -

County or Similar Government Division:

Phone: - - Ext.

E-mail:

Operator Point of Contact Information:

First Name, Middle Initial, Last Name:

Title:

NOI Preparer (Complete if NOI was prepared by someone other than the certifier):

First Name, Middle Initial, Last Name:

Organization:

Phone: - - Ext.

E-mail:

IV. Project/Site Information

Project/Site Name:

Project/Site Address:

Street/Location:

City: State: ZIP Code: -

County or Similar Government Subdivision:

For the project/site you are seeking permit coverage, provide the following information:

Latitude/Longitude (Use decimal degrees and specify method):

Latitude: __ __. __ __ __ __° N (decimal degrees) Longitude: __ __ __. __ __ __ __° W (decimal degrees)

Latitude/Longitude Data Source: ☐ Map ☐ GPS ☐ Other_____ Horizontal Reference Datum: ☐ NAD 27 ☐ NAD 83 ☐ WGS 84

Is your project/site located in Indian country lands, or located on a property of religious or cultural significance to an Indian tribe? ☐ YES ☐ NO

If yes, provide the name of the Indian tribe associated with the area of Indian country (including name of Indian reservation, if applicable), or if not in Indian country, provide the name of the Indian tribe associated with the property:

Estimated Project Start Date: / / Estimated Project Completion Date: / /

Estimated Area to be Disturbed (to the nearest quarter acre): .

Type of Construction Site (check all that apply): ☐ Single-Family Residential ☐ Multi-Family Residential ☐ Commercial ☐ Industrial

☐ Institutional ☐ Highway or Road ☐ Utility ☐ Other

Will there be demolition of any structure built or renovated before January 1, 1980? ☐ YES ☐ NO

If yes, do any of the structures being demolished have at least 10,000 square feet of floor space? ☐ YES ☐ NO

Was the pre-development land use used for agriculture (see Appendix A for definition of "agricultural land")? ☐ YES ☐ NO

Have earth-disturbing activities commenced on your project/site? ☐ YES ☐ NO

If yes, is your project an "emergency-related project" (see Appendix A)? ☐ YES ☐ NO

Have stormwater discharges from your project/site been covered previously under an NPDES permit? ☐ YES ☐ NO

If yes, provide the NPDES ID (if you had coverage under EPA's 2012 CGP or the NPDES permit number if you had coverage under an EPA individual permit:

V. Discharge Information

By indicating "Yes" below, I confirm that I understand that the CGP only authorizes the allowable stormwater discharges in Part 1.2.1 and the allowable non-stormwater discharges listed in Part 1.2.2. Any discharges not expressly authorized in this permit cannot become authorized or shielded from liability under CWA section 402(k) by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including the Notice of Intent (NOI) to be covered by the permit, the Stormwater Pollution Prevention Plan (SWPPP), during an inspection, etc. If any discharges requiring NPDES permit coverage other than the allowable stormwater and non-stormwater discharges listed in Parts 1.2.1 and 1.2.2 will be discharged, they must be covered under another NPDES permit.
☐ YES

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? ☐ YES ☐ NO

Are there any waters of the U.S. within 50 feet of your project's earth disturbances? ☐ YES ☐ NO

Receiving Waters Information: (Attach a separate list if necessary)

Point of Discharge ID	For each point of discharge, provide the following receiving water information:		
	Provide the name of the first water of the U.S. that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to:	**If the receiving water is impaired (on the CWA 303(d) list), list the pollutants that are causing the impairment:**	**If a TMDL been completed for this receiving waterbody, providing the following information:**
			TMDL Name and ID: **Pollutant(s) for which there is a TMDL:**
			TMDL Name and ID: **Pollutant(s) for which there is a TMDL:**
			TMDL Name and ID: **Pollutant(s) for which there is a TMDL:**
			TMDL Name and ID: **Pollutant(s) for which there is a TMDL:**

			TMDL Name and ID: **Pollutant(s) for which there is a TMDL:**
			TMDL Name and ID: **Pollutant(s) for which there is a TMDL:**

Are any of the waters of the U.S. to which you discharge designated by the state or tribal authority under its antidegradation policy as a Tier 2 (or Tier 2.5) water (water quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water) or as a Tier 3 water (Outstanding National Resource Water)? (See Appendix F).

☐ YES ☐ NO

If yes, name(s) of receiving water(s) and its designation (Tier 2, Tier 2.5 or Tier 3):

VI. Chemical Treatment Information

Will you use polymers, flocculants, or other treatment chemicals at your construction site? ☐ YES ☐ NO

If yes, will you use cationic treatment chemicals at your construction site*? ☐ YES ☐ NO

If yes, have you been authorized to use cationic treatment chemicals by your applicable EPA Regional Office in advance of filing your NOI*? ☐ YES ☐ NO

If you have been authorized to use cationic treatment chemicals by your applicable EPA Regional Office, attach a copy of your authorization letter and include documentation of the appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards.

Please indicate the treatment chemicals that you will use:

* Note: You are ineligible for coverage under this permit unless you notify your applicable EPA Regional Office in advance and the EPA office authorizes coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards.

VII. Stormwater Pollution Prevention Plan (SWPPP) Information

Has the SWPPP been prepared in advance of filing this NOI, as required? ☐ YES ☐ NO

SWPPP Contact Information:

First Name, Middle Initial Last Name:

Professional Title:

Phone: - - Ext.

E-mail:

VIII. Endangered Species Protection

Using the instructions in Appendix D of the CGP, under which criterion listed below are you eligible for coverage under this permit? Check only 1 box, include the required information and provide a sound basis for supporting the criterion selected. You must consider Endangered Species Act listed threatened or endangered species (ESA-listed) and/or designated critical habitat(s) under the jurisdiction of both the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) and select the most conservative criterion that applies.

☐ **A** No ESA-listed species and/or designated critical habitat present in action area. Using the process outlined in Appendix D of this permit, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's "action area" as defined in Appendix A of this permit. ***[Basis statement content: A basis statement supporting the selection of this criterion should identify the USFWS and NMFS information sources used. Attaching aerial image(s) of the site to this NOI is helpful to EPA, USFWS, and NMFS in confirming eligibility under this criterion. Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers.]***

☐ **B** Eligibility requirements met by another operator under the 2017 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2017 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2017CGP operator's notification of authorization under this permit. If your certification is based on another 2017 CGP operator's certification under criterion C, you must provide EPA with the relevant supporting information required of existing dischargers in criterion C in your NOI form. ***[Basis statement content: A basis statement supporting the selection of this criterion should identify the eligibility criterion of the other CGP NOI, the authorization date, and confirmation that the authorization is effective.]***

If you select criterion B, provide the NPDES ID from the other operator's notification of authorization under this permit: | | | | | | | | | | |

☐ **C** Discharges not likely to adversely affect ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify to EPA that your site's discharges and discharge-related activities are not likely to adversely affect ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. You must also include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with this NOI. ***[Basis statement content: A basis statement supporting the selection of this criterion should identify the information resources and expertise (e.g., state or federal biologists) used to arrive at this conclusion. Any supporting documentation should explicitly state that both ESA-listed species and designated critical habitat under the jurisdiction of the USFWS and/or NMFS were considered in the evaluation.]***

What ESA-listed species and/or designated critical habitat are located in your "action area":

Distance between your site and the ESA-listed species and/or designated critical habitat within the action area (in miles, state "on site" if the ESA-listed species and/or designated critical habitat is within the area to be disturbed):

☐ **D** Coordination with USFWS and/or NMFS has successfully concluded. Coordination between you and the USFWS and/or NMFS has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written concurrence from USFWS and/or NMFS that your site's discharges and discharge-related activities are not likely to adversely affect listed species and/or critical habitat. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI. ***[Basis statement content: A basis statement supporting the selection of this criterion should identify whether USFWS or NMFS or both agencies participated in coordination, the field office/regional office(s) providing that coordination, and the date that coordination concluded.]***

☐ **E** ESA Section 7 consultation has successfully concluded. Consultation between a Federal Agency and the USFWS and/or NMFS under section 7 of the ESA has concluded. The consultation must have addressed the effects of the construction site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS. To certify eligibility under this criterion, Indicate the result of the consultation:

☐ biological opinion from USFWS and/or NMFS that concludes that the action in question (taking into account the effects of your site's discharges and discharge-related activities) is not likely to jeopardize the continued existence of listed species, nor the destruction or adverse modification of critical habitat; or

☐ written concurrence from USFWS and/or NMFS with a finding that the site's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat.

You must include copies of the correspondence between yourself and the USFWS and/or NMFS in your SWPPP and this NOI. ***[Basis statement content: A basis statement supporting the selection of this criterion should identify the federal action agencie(s) involved, the field office/regional office(s) providing that consultation, any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the consultation was completed.]***

☐ **F** Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI. ***[Basis statement content: A basis statement supporting the selection of this criterion should identify whether USFWS or NMFS or both agencies provided a section 10 permit, the field office/regional office(s) providing permit(s), any tracking numbers of identifiers associated with that consultation (e.g., IPaC number, PCTS number), and the date the permit was granted.]***

Provide a brief summary of the basis for criterion selection listed above *[the necessary content for a supportive basis statement is provided under the criterion you selected.]*.

IX. Historic Preservation

Are you installing any stormwater controls as described in Appendix E that require subsurface earth disturbance? (Appendix E, Step 1) ☐ YES ☐ NO

If yes, have prior surveys or evaluations conducted on the site have already determined historic properties do not exist, or that prior disturbances have precluded the existence of historic properties? (Appendix E, Step 2) ☐ YES ☐ NO

If no, have you determined that your installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties? (Appendix E, Step 3) ☐ YES ☐ NO

If no, did the SHPO, THPO, or other tribal representative (whichever applies) respond to you within the 15 calendar days to indicate whether the subsurface earth disturbances caused by the installation of stormwater controls affect historic properties? (Appendix E, Step 4) ☐ YES ☐ NO

If yes, describe the nature of their response:

☐ Written indication that no historic properties will be affected by the installation of stormwater controls.

☐ Written indication that adverse effects to historic properties from the installation of stormwater controls can be mitigated by agreed upon actions.

☐ No agreement has been reached regarding measures to mitigate effects to historic properties from the installation of stormwater controls.

☐ Other:

X. Certification Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

First Name, Middle Initial, Last Name:

Title:

Signature: Date: / /

Email:

Who Must File an NOI Form

Under the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et. seq.; the Act), federal law prohibits stormwater discharges from certain construction activities to waters of the U.S. unless that discharge is covered under a National Pollutant Discharge Elimination System (NPDES) permit. Operators of construction sites where one or more acres are disturbed, smaller sites that are part of a larger common plan of development or sale where there is a cumulative disturbance of at least one acre, or any other site specifically designated by the Director, must obtain coverage under an NPDES general permit. For coverage under the 2017 CGP, each person, firm, public organization, or any other entity that meets either of the following criteria must file a Notice of Intent form: (1) they have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or (2) they have day-to-day operational control of those activities at the project necessary to ensure compliance with the permit conditions. If you have questions about whether you need a NPDES stormwater permit, or if you need information to determine whether EPA or your state agency is the permitting authority, contact your EPA Regional Office.

Completing the Form

Obtain and read a copy of the 2017 CGP, viewable at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#cgp. To complete this form, type or print uppercase letters, in the appropriate areas only. Please place each character between the marks (abbreviate if necessary to stay within the number of characters allowed for each item). Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, telephone EPA's NOI Processing Center at (866) 352-7755. **Please submit the original document with signature in ink - do not send a photocopied signature.**

Section I. Approval to Use Paper NOI Form

You must indicate whether you have been granted a waiver from electronic reporting from the EPA Regional Office. Note that you are not authorized to use this paper NOI form unless the EPA Regional Office has approved its use. Where you have obtained approval to use this form, indicate the waiver that you have been granted, the name of the EPA staff person who granted the waiver, and the date that approval was provided.

See https://www.epa.gov/npdes/contact-us-stormwater#regional

for a list of EPA Regional Office contacts.

Section II. Permit Number

Provide the master permit number of the permit under which you are applying for coverage (see Appendix B of the general permit for the list of eligible master permit numbers)

Section III. Operator Information

Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this NOI. Refer to Appendix A of the permit for the definition of "operator".

Indicate whether you are seeking coverage under this permit as a "federal operator" as defined in Appendix A.

Also provide a point of contact, the operator's mailing address, county, telephone number, and e-mail address (to be notified via e-mail of NOI approval when available). Correspondence for the NOI will be sent to this address.

If the NOI was prepared by someone other than the certifier (for example, if the NOI was prepared by the facility SWPPP contact or a consultant for the certifier's signature), include the full name, organization, phone number, and email address of the NOI preparer.

Section IV. Project/Site Information

Enter the official or legal name and complete street address, including city, state, ZIP code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for permit coverage to be granted.

Provide the latitude and longitude of your facility in decimal degrees format. The latitude and longitude of your facility can be determined in several different ways, including through the use of global positioning system (GPS) receivers, U.S. Geological Survey (U.S.G.S.) topographic or quadrangle maps, and web-based siting tools, among others. For consistency, EPA requests that measurements be taken from the approximate center of the construction site. For linear construction sites, the measurement should be taken midpoint of the site. If known, enter the horizontal reference datum for your latitude and longitude. The horizontal reference datum is shown on the bottom left corner of USGS topographic maps; it is also available for GPS receivers.

Indicate whether the project is in Indian country lands or located on a property of religious or cultural significance to an Indian tribe, and if so, provide the name of the Indian tribe associated with the area of Indian country (including name of Indian reservation, if applicable), or if not in Indian country, provide the name of the Indian tribe associated with the property.

Enter the estimated construction start and completion dates using four digits for the year (i.e., 10/06/2012). Indicate to the nearest quarter acre the estimated area to be disturbed.

Indicate the type of construction site, if demolition is occurring, and if so, if the structure has at least 10,000 square feet of floor space. Indicate whether the pre-development land use of the site was used for agriculture Appendix A defines "agricultural land" as cropland, grassland, rangeland, pasture, and other agricultural land, on which agricultural and forest-related products or livestock are produced and resource concerns may be addressed. Agricultural lands include cropped woodland, marshes, incidental areas included in the agricultural operation, and other types of agricultural land used for the production of livestock.

Indicate whether earth-disturbing activities have already commenced on your project/site. If earth-disturbing activities have commenced on your site because stormwater discharges from the site have been previously covered under a NPDES permit, you must provide the 2012 CGP NPDES ID or the NPDES permit number if coverage was under an individual permit.

Section V. Discharge Information

You must confirm that you understand that the CGP only authorizes the allowable stormwater discharges listed in Part 1.2.1 and the allowable non-stormwater discharges listed in Part 1.2.2.

Any discharges not expressly authorized under the CGP are not covered by the CGP or the permit shield provision of the CWA Section 402(k) and they cannot become authorized or shielded by disclosure to EPA, state, or local authorities via the NOI to be covered by the permit or by any other means (e.g., in the SWPPP or during an inspection). If any discharges requiring NPDES permit coverage other than the allowable stormwater and non-stormwater discharges listed in Parts 1.2.1 and 1.2.2 will be discharged, they must either be eliminated or covered under another NPDES permit.

Indicate whether discharges from the site will enter into a municipal separate storm sewer system (MS4), as defined in Appendix A.

Also, indicate whether any waters of the U.S. exist within 50 feet from your site. Note that if "yes", you are required to comply with the requirement in Part 2.2.1 of the permit to provide natural buffers or equivalent erosion and sediment controls.

For each unique point of discharge you list, you must specify the name of the first water of the U.S. that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to. You must specify whether any waters of the U.S. that you discharge to are listed as "impaired" as defined in Appendix A, and the pollutants for which the water is impaired. You must identify any Total Maximum Daily Loads (TMDL) that have been completed for any of the waters of the U.S. that you discharge to.

Indicate whether discharges from the site will enter into a water of the U.S. that is designated as a Tier 2, Tier 2.5, or Tier 3 water. A list of Tier 2, 2.5, and 3 waters is provided as Appendix F. If the answer is "yes", name all waters designated as Tier 2, Tier 2.5, or Tier 3 to which the site will discharge.

Section VI. Chemical Treatment Information

Indicate whether the site will use polymers, flocculants, or other treatment chemicals. Indicate whether the site will employ cationic treatment chemicals. If the answer is "yes" to either question, indicate which chemical(s) you will use. Note that you are not eligible for coverage under this permit to use cationic treatment chemicals unless you notify your applicable EPA Regional Office in advance and the EPA office authorizes coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards. If you have been authorized to use cationic treatment chemicals by your applicable EPA Regional Office, attach a copy of your authorization letter and include documentation of the appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards. Examples of cationic treatment chemicals include, but are not limited to, cationic polyacrylamide (C-PAM), PolyDADMAC (POLYDIALLYLDIMETHYLAMMONIUM CHLORIDE), and chitosan.

Section VII. Stormwater Pollution Prevention Plan (SWPPP) Information

All sites eligible for coverage under this permit are required to prepare a SWPPP in advance of filing the NOI, in accordance with Part 7. Indicate whether the SWPPP has been prepared in advance of filing the NOI.

Indicate the street, city, state, and ZIP code where the SWPPP can be found. Indicate the contact information (name, organization, phone, and email) for the person who developed the SWPPP for this project.

Section VIII. Endangered Species Information

Using the instructions in Appendix D, indicate under which criterion (i.e., A, B, C, D, E, or F) of the permit the applicant is eligible with regard to protection of ESA-listed endangered and threatened species and designated critical habitat. A description of the basis for the criterion selected must also be provided.

If criterion B is selected, provide the NPDES Number for the other operator who had previously certified their eligibility for the CGP under criterion A, C, D, E, or F. The Tracking Number was assigned when the operator received coverage under this permit, and is included in the notice of authorization.

If criterion C is selected, you must attach copies of your site map. See Part 7.2.4 of the permit for information about what is required to be in your site map. You must also specify the federally-listed species and/or federally-designated critical habitat that are located in the "action area" of the project, and provide the distance between the construction site and any listed endangered species and/or their designated critical habitat.

If criterion D, E, or F is selected, attach copies of any communications between you and the U.S. Fish and Wildlife Service and National Marine Fisheries Service and identify the participating agencies and Field Offices/Regional Offices you worked with in the basis statement of this NOI.

Section IX. Historic Preservation

Use the instructions in Appendix E to complete the questions on the NOI form regarding historic preservation.

Section X. Certification Information

The NOI must be signed as follows:

For a corporation: By a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means:

(i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or

(ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA). Include the name and title of the person signing the form and the date of signing. An unsigned or undated NOI form will not be considered eligible for permit coverage.

Modifying Your NOI

If you have been granted a waiver from your Regional Office from electronic reporting, and if after submitting your NOI you need to correct or update any fields on this NOI form, you may do so by indicating changes on this same form. Paperwork Reduction Act Notice

Public reporting burden for this NOI is estimated to average 3.7 hours. This estimate includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Chief, Information Policy Branch 2136, U.S. Environmental Protection, Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB control number on any correspondence. Do not send the completed form to this address.

Submitting Your Form

Submit your NOI form by mail to one of the following addresses:

For Regular U.S. Mail Delivery:
Stormwater Notice Processing Center
Mail Code 4203M, ATTN: 2017 CGP
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

For Overnight/Express Mail Delivery:
Stormwater Notice Processing Center
William Jefferson Clinton East Building - Room 7420
ATTN: 2017 CGP
U.S. EPA
1201 Constitution Avenue, NW
Washington, DC 20004

Visit this website for instructions on how to submit electronically:

https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting

Appendix K - Notice of Termination (NOT) Form and Instructions

Part 8.3 requires you to use the NPDES eReporting Tool, or "NeT" system, to prepare and submit your NOT electronically. However, if you are given a waiver by the EPA Regional Office to use a paper NOT form, and you elect to use it, you must complete and submit the following form.

NPDES FORM 3510-13	EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY WASHINGTON, DC 20460 NOTICE OF TERMINATION (NOT) FOR THE 2017 NPDES CONSTRUCTION GENERAL PERMIT	Form Approved. OMB No. 2040-0004

Submission of this Notice of Termination constitutes notice that the operator identified in Section III of this form is no longer authorized discharge pursuant to the NPDES Construction General Permit (CGP) from the site identified in Section IV of this form. All necessary information must be included on this form. Refer to the instructions at the end of this form.

I. Approval to Use Paper NOT Form

Have you been granted a waiver from electronic reporting from the Regional Office *? ☐ YES ☐ NO

If yes, check which waiver you have been granted, the name of the EPA Regional Office staff person who granted the waiver, and the date of approval:

Waiver granted:

☐ The owner/operator's headquarters is physically located in a geographic area (i.e., ZIP code or census tract) that is identified as under-served for broadband Internet access in the most recent report from the Federal Communications Commission.

☐ The owner/operator has issues regarding available computer access or computer capability.

Name of EPA staff person that granted the waiver:

Date approval obtained: / /

*** Note: You must have been given approval by the Regional Office prior to using this paper NOT form. If you have not obtained a waiver, you must file this form electronically using the NDPES eReporting Tool (NeT).**

II. Permit Information

NPDES ID:

Reason for Termination (Check only one):

☐ You have completed all construction activities at your site, and you have met all other requirements in Part 8.2.1.

☐ Another operator has assumed control over all areas of the site and that operator has submitted an NOI and obtained coverage under the CGP.

☐ You have obtained coverage under an individual permit or another general NPDES permit addressing stormwater discharges from the construction site.

III. Operator Information

Operator Name:

Mailing Address:

Street:

City: State: ZIP Code: -

County or Similar Government Division:

Phone: - - Ext.

E-mail:

IV. Project/Site Information

Project/Site Name:

Project/Site Address:

Street/Location:

City: State: ZIP Code: -

County or Similar Government Division:

V. Certification Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

First Name, Middle Initial, Last Name:

Title:

Signature: _____ Date: / /

Email:

Notice of Termination for the 2017 NPDES Construction General Permit

NPDES Form Date (2/17) This Form Replaces Form 3510-13 (02/12) Form Approved OMB No. 2040-0004

Who May File an NOT Form
Permittees who are presently covered under the EPA-issued 2017 Construction General Permit (CGP) for Stormwater Discharges Associated with Construction Activity may submit an NOT form when: (1) earth-disturbing activities at the site are completed and the conditions in Parts 8.2.1.a through 8.2.1.b are met; or (2) the permittee has transferred all areas under its control to another operator, and that operator has submitted and obtained coverage under this permit; or (3) the permittee has obtained coverage under a different NPDES permit for the same discharges.

Completing the Form
Type or print, using uppercase letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use only one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions about this form, refer to https://www.epa.gov/npdes/stormwater-discharges-construction-activities#cgp or telephone EPA's NOI Processing Center at (866) 352-7755. Please submit original document with signature in ink - do not send a photocopied signature.

Section I. Approval to Use Paper NOT Form
You must indicate whether you have been granted a waiver from electronic reporting from the EPA Regional Office. Note that you are not authorized to use this paper NOT form unless the EPA Regional Office has approved its use. Where you have obtained approval to use this form, indicate the waiver that you have been granted, the name of the EPA staff person who granted the waiver, and the date that approval was provided.

Seehttps://www.epa.gov/npdes/contact-us-stormwater#regional for a list of EPA Regional Office contacts.

Section II. Permit Information
Enter the existing NPDES ID assigned to the project . If you do not know the permit tracking number, or contact EPA's NOI Processing Center at (866) 352-7755.

Indicate your reason for submitting this Notice of Termination by checking the appropriate box. Check only one.

Section III. Operator Information
Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this NOT and is covered by the NPDES ID identified in Section II. Enter the complete mailing address, telephone number, and email address of the operator.

Section IV. Project/Site Information
Enter the official or legal name and complete street address, including city, state, ZIP code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for termination of permit coverage to be valid.

Section V. Certification Information
The NOT, must be signed as follows:

For a corporation: By a responsible corporate officer. For the purpose of this Part, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy-or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Include the name, title, and email address of the person signing the form and the date of signing. An unsigned or undated NOT form will not be considered valid termination of permit coverage.

Paperwork Reduction Act Notice
Public reporting burden for this NOT is estimated to average 0.5 hours per notice, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form including any suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, 2136, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460. Include the OMB number on any correspondence. Do not send the completed form to this address.

Submitting Your Form:
Submit your NOT form by mail to one of the following addresses:

For Regular U.S. Mail Delivery:
Stormwater Notice Processing Center
Mail Code 4203M, ATTN: 2017 CGP
U.S. EPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

For Overnight/Express Mail Delivery:
Stormwater Notice Processing Center
William Jefferson Clinton East Building - Room 7420
ATTN: 2017 CGP
U.S. EPA
1201 Constitution Avenue, NW
Washington, DC 20004

Visit this website for instructions on how to submit electronically:
https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting

Appendix L – Suggested Format for Request for Chemical Treatment

If you plan to add "cationic treatment chemicals" (as defined in Appendix A) to stormwater and/or authorized non-stormwater prior to discharge, Part 1.1.9 requires you to notify your applicable EPA Regional Office in advance of submitting your NOI. The EPA Regional Office will authorize coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to an exceedance of water quality standards. To notify your EPA Regional Office, you may use following form.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460
SUGGESTED FORMAT FOR NOTIFYING EPA ABOUT PROPOSED USE OF CATIONIC TREATMENT CHEMICALS UNDER THE 2017 NPDES CONSTRUCTION GENERAL PERMIT

Under Part 1.1.9 of the 2017 CGP, if you plan to add "cationic treatment chemicals" (as defined in Appendix A) to stormwater and/or authorized non-stormwater prior to discharge, you may not submit your Notice of Intent (NOI) until you notify your applicable EPA Regional Office in advance and the EPA Regional Office authorizes coverage under this permit after you have included appropriate controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a violation of water quality standards. You may use this suggested form to notify your EPA Regional Office about your proposed use of cationic treatment chemicals.

I. Operator Information

Operator Name:

Mailing Address:

Street:

City: State: ZIP Code: -

Phone: - - Ext.

E-mail:

II. Project/Site Information

Project/Site Name:

Project/Site Address:

Street/Location:

City: State: ZIP Code: -

County or Similar Government Subdivision:

Site contact name (if different from operator):

Site contact phone (if different from operator): - -

Name(s) of receiving waterbodies: _____

_____

_____

_____

III. Map

Attach a map that illustrates the entire site including all of the below items. Include this map in your Stormwater Pollution Prevention Plan (SWPPP):
- All receiving waterbodies
- All proposed location(s) of chemical treatment system(s)
- All proposed point(s) of discharge to receiving waterbodies
- All soil types within areas to be disturbed
- All area of earth disturbance
- Sufficient indication of topography to indicate where stormwater flows

Attach a schematic drawing of the proposed treatment system(s). Include all components of the treatment train, sample points, and pipe configurations. In addition to sufficient holding capacity upstream of treatment, the system must have the capacity to hold water for testing and to re-treat water that does not meet water quality standards.

IV. Responsible Personnel

Treatment System Operator or Company Name (if subcontracted out):

Street/Location:

City: State: Zip Code: -

Responsible personnel. List personnel who will be responsible for operating the chemical treatment systems and application of the chemicals. Cite the training that the personnel have received in operation and maintenance of the treatment system(s) and use of the specific chemical(s) proposed.

V. Proposed Treatment

Check proposed treatment system.

- ☐ Chitosan enhanced sand filtration with discharge to infiltration (ground water)
- ☐ Chitosan enhanced sand filtration with discharge to temporary holding ponds (batch).
- ☐ Chitosan enhanced sand filtration with discharge to surface waters (flow-through).
- ☐ Other (describe below and submit documentation that the proposed system and chemical(s) demonstrate the ability to remove turbidity and produce non-toxic effluent/ discharge)

Check proposed cationic chemical(s) to be used:

- ☐ FlocClear™ (2% chitosan acetate solution)
- ☐ StormKlear™ LiquiFloc™ (1% chitosan acetate solution).
- ☐ ChitoVan™ (1% chitosan acetate solution).
- ☐ StormKlear™ LiquiFloc™ (3% Chitosan acetate solution)
- ☐ Other _____

Estimated Treatment Period Start Date: / / Estimated Treatment Period End Date: / /

Describe sampling and recordkeeping schedule. Attach additional sheets as needed:

Explain why you have selected this proposed treatment system and chemicals. Include an explanation of why the use of cationic treatment chemicals is necessary at the site. Reference how the soil types on your site influenced your choices. Describe or provide an illustration of how the site of the discharge will be stabilized and why the discharge location will not cause erosion of the discharge water's bank or bed (please note that a permit from the Corps and state agencies may be necessary to place rock in the water body for this stabilization). Attach as many additional sheets as needed for a full explanation. If you have a report from a chemical treatment contractor describing their recommended approach you may attach that.

VI. Certification Information

I have documented and hereby certify that the following information is correct and has been documented in the SWPPP for this project:

- The SWPPP includes a complete site-specific description of the chemical treatment system herein proposed for use, including specifications, design, and Material Safety Data Sheets for all chemicals to be used.
- The controls to be used on the site are compatible with the safe and effective use of cationic chemical treatment.
- I verified through jar tests that the site soil is conducive to chemical treatment.
- I verified that the chemical treatment system operators for this project received training.
- I read, understand, and will follow all conditions and design criteria in the applicable use designation(s).
- If the discharge is to tribal waters, I notified the appropriate tribal government of the intent to use chemical treatment on a site located within that jurisdiction.
- I will keep the use level designation, operation and maintenance manual, and training certificate on site prior to and during use of chemical treatment.
- A licensed engineer designed the system for this project including system sizing, pond sizing, and flow requirements.
- I verify that the discharge will not adversely affect downstream conveyance systems or stream channels (e.g. cause erosion).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Authorized Official First Name, Middle Initial, Last Name:

Title:

Signature: _____ Date: / /

Email:

Instructions for Submitting This Form:

Submit your this form to your applicable EPA Regional Office. Contact information can be found at: https://www.epa.gov/npdes/contact-us-stormwater#regional

Appendix C – Copy of NOI and EPA Authorization email

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

General Operating Permit

In compliance with the Missouri Clean Water Law, (chapter 644 R.S. Mo as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.:	MORA18191
Owner Address:	Barry Lawrence Regional Library 213 6th Street #2417 Monett, MO 65708
Continuing Authority:	Barry Lawrence Regional Library 213 6th Street #2417 Monett, MO 65708
Facility Name: Facility Address:	Barry Lawrence Regional Library 2200 Park Street MONETT, MO 65708 - 6570
Legal Description: UTM Coordinates: Receiving Stream: First Classified Stream - ID#: USGS# and Sub Watershed#:	Sec. 29, T 26N, R 27W, Lawrence County 419751.572 / 4087472.550 Tributary to Kelly Creek (U) 100K Extent-Remaining Streams (C) 3960.00 11070207 - 0704

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein.

FACILITY DESCRIPTION

All Outfalls - Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit authorizes only wastewater, including storm water, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System, it does not apply to other regulated areas. This permit may be appealed in accordance with RSMo Section 644.051.6 and 621.250, 10 CSR 20-6.020, and 10 CSR 20-1.020.

Edward B. Galbraith

05-26-2021
Issue date

Edward B. Galbraith, Director, Division of Environmental Quality

Chris Wieberg

02/07/2022
Expiration date

Chris Wieberg, Director, Water Protection Program

Appendix D – Copy of Inspection Form

(Note: EPA has developed a sample inspection form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

2017 Construction General Permit
Inspection Report Template – Field Version

Purpose
This Inspection Report Template (or "template") is to assist you in preparing inspection reports for EPA's 2017 Construction General Permit (CGP). If you are covered under the 2017 CGP, you can use this template to create an inspection report form that is customized to the specific circumstances of your site and that complies with the minimum reporting requirements of Part 4.7 of the permit. Note that the use of this form is optional; you may use your own inspection report form provided it includes the minimum information required in Part 4.7 of the CGP.

If you are covered under a state CGP, this template may be helpful in developing a form that can be used for that permit; however, it will need to be modified to meet the specific requirements of that permit. If your permitting authority requires you to use a specific inspection report form, you should not use this form.

Notes:
While EPA has made every effort to ensure the accuracy of all instructions contained in the Inspection Report Template, it is the permit, not the template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between the Inspection Report Template and any corresponding provision of the 2017 CGP, you must abide by the requirements in the permit. EPA welcomes comments on the Inspection Report Template at any time and will consider those comments in any future revision of this document. You may contact EPA for CGP-related inquiries at cgp@epa.gov.

Overview of Inspection Requirements (see CGP Part 4)
Construction operators covered under the 2017 CGP are subject to the following inspection requirements:

Person(s) Responsible for Inspecting the Site (see Part 4.1)
The person(s) inspecting your site must be a "qualified person" who may be either on your staff or a third party you hire to conduct such inspections.

- A "qualified person" is a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality, and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Inspection Frequency (see Part 4.2)
You are required to conduct inspections either:

- Once every 7 calendar days; or
- Once every 14 calendar days and within 24 hours of a storm event of 0.25 inches or greater or the occurrence of runoff from snowmelt sufficient to cause a discharge.

Your inspection frequency is increased if the site discharges to a sensitive water. See Part 4.3. Your inspection frequency may be decreased to account for stabilized areas, or for arid, semi-arid, or drought-stricken conditions, or for frozen conditions. See Part 4.4.

Areas That Need to Be Inspected (see Part 4.5)
During each inspection, you must inspect the following areas of your site:

- Cleared, graded, or excavated areas of the site;
- Stormwater controls (e.g., perimeter controls, sediment basins, inlets, exit points etc.) and pollution prevention practices (e.g., pollution prevention practices for vehicle fueling/maintenance and washing, construction product storage, handling, and disposal, etc.) at the site;
- Material, waste, or borrow areas covered by the permit, and equipment storage and maintenance areas;
- Areas where stormwater flows within the site;
- Stormwater discharge points; and
- Areas where stabilization has been implemented.

What to Check For During Your Inspection (see Part 4.6)
During your site inspection, you are required to check:

- Whether stormwater controls or pollution prevention practices are properly installed, require maintenance or corrective action, or whether new or modified controls are required;
- For the presence of conditions that could lead to spills, leaks, or other pollutant accumulations and discharges;
- For locations where new or modified stormwater controls are necessary to meet requirements of the permit;

- Whether there are visible signs of erosion and sediment accumulation at points of discharge and to the channels and streambanks that are in the immediate vicinity of the discharge;
- If a stormwater discharge is occurring at the time of the inspection, whether there are obvious, visual signs of pollutant discharges; and
- If any permit violations have occurred on the site.

Inspection Reports (see Part 4.7)
Within 24 hours of completing each inspection, you are required to complete an inspection report that includes:

- Date of inspection;
- Names and titles of person(s) conducting the inspection;
- Summary of inspection findings;
- Rain gauge or weather station readings if your inspection is triggered by the 0.25-inch storm threshold; and
- If you determine that a portion of your site is unsafe to access for the inspection, documentation of what conditions prevented the inspection and where these conditions occurred on the site

Instructions for Using This Template
This Field Version of the Inspection Report Template is intended to be used in the field and filled out by hand. If you will be filling out the Inspection Report Template electronically (i.e., you will be typing in your findings), please use the Electronic Version of the Inspection Report Template available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources. The Electronic Version includes text fields with instructions for what to enter.

Keep in mind that this document is a template and not an "off-the-shelf" inspection report that is ready to use without some modification. You must first customize this form to include the specifics of your project in order for it to be useable for your inspection reports. Once you have entered all of your site-specific information into these fields, you may print out this form for use in the field to complete inspection reports.

The following tips for using this template will help you ensure that the minimum permit requirements are met:

- **Review the inspection requirements.** Before you start developing your inspection report form, read the CGP's Part 4 inspection requirements. This will ensure that you have a working understanding of the permit's underlying inspection requirements.
- **Complete all required text fields.** Fill out all text fields. Only by filling out all fields will the template be compliant with the requirements of the permit. (Note: Where you do not need the number of rows provided in the template form for your inspection, you may leave those rows blank. Or, if you need more space to document your findings, you may add an additional sheet.)
- **Use your site map to document inspection findings.** In several places in the template, you are directed to specify the location of certain features of your site, including where stormwater controls are installed and where you will be stabilizing exposed soil. You are also asked to fill in location information for unsafe conditions and the locations of any discharges occurring during your inspections. Where you are asked for location information, EPA encourages you to reference the point on your SWPPP site map that corresponds to the requested location on the inspection form. Using the site map as a tool in this way will help you conduct efficient inspections, will assist you in evaluating problems found, and will ensure proper documentation.
- **Sign and certify each inspection report.** The operator or a duly authorized representative (see Appendix I, Part I.11.2) must sign and certify each inspection report for it to be considered complete. Where a contractor or subcontractor carries out your inspections, it is recommended that you also have the inspector sign and certify the form, in addition to the signature and certification required of the permitted operator. The template includes a signature block for both parties.
- **Include the inspection form with your SWPPP.** Once your form is complete, make sure to include a copy of the inspection form in your SWPPP in accordance with Part 7.2.7.e of the CGP.
- **Retain copies of all inspection reports with your records.** You must also retain in your records copies of all inspection reports in accordance with the requirements in Part 4.7.3 of the 2017 CGP. These reports must be retained for at least 3 years from the date your permit coverage expires or is terminated.

Section-by-Section Instructions
You will find specific instructions corresponding to each section of the report form on the reverse side of each page. These instructions provide you with more details in terms of what EPA expects to be documented in these reports.

General Information
(see reverse for instructions)

Name of Project		**NPDES ID No.**		**Inspection Date**	
Weather conditions during inspection		**Inspection start time**		**Inspection end time**	
Inspector Name, Title & Contact Information					
Present Phase of Construction					
Inspection Location (if multiple inspections are required, specify location where this inspection is being conducted)					

Inspection Frequency *(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply)*

Standard Frequency:

☐ Every 7 days

☐ Every 14 days and within 24 hours of a 0.25" rain or the occurrence of runoff from snowmelt sufficient to cause a discharge

Increased Frequency:

☐ Every 7 days and within 24 hours of a 0.25" rain (for areas of sites discharging to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3)

Reduced Frequency:

☐ Twice during first month, no more than 14 calendar days apart; then once per month after first month; (for stabilized areas)

☐ Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of a 0.25" rain (for stabilized areas on "linear construction sites")

☐ Once per month and within 24 hours of a 0.25" rain (for arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought)

☐ Once per month (for frozen conditions where earth-disturbing activities are being conducted)

Was this inspection triggered by a 0.25" storm event? ☐ Yes ☐ No

If yes, how did you determined whether a 0.25" storm event has occurred?

☐ Rain gauge on site ☐ Weather station representative of site. Specify weather station source:

Total rainfall amount that triggered the inspection (in inches)**:**

Was this inspection triggered by the occurrence of runoff from snowmelt sufficient to cause a discharge? ☐ Yes ☐ No

Unsafe Conditions for Inspection

Did you determine that any portion of your site was unsafe for inspection per CGP Part 4.5? ☐ Yes ☐ No

If "yes", complete the following:

- Describe the conditions that prevented you from conducting the inspection in this location:

- Location(s) where conditions were found:

Instructions for Filling Out "General Information" Section

Name of Project
Enter the name for the project.

NPDES ID No.
Enter the NPDES ID number that was assigned to your NOI for permit coverage.

Inspection Date
Enter the date you conducted the inspection.

Weather Conditions During Inspection
Enter the weather conditions occurring during the inspection, e.g., sunny, overcast, light rain, heavy rain, snowing, icy, windy.

Inspection start and end times
Enter the time you started and ended the inspection.

Inspector Name, Title & Contact Information
Provide the name of the person(s) (either a member of your company's staff or a contractor or subcontractor) that conducted this inspection. Provide the inspector's name, title, and contact information as directed in the form.

Present Phase of Construction
If this project is being completed in more than one phase, indicate which phase it is currently in.

Inspection Location
If your project has multiple locations where you conduct separate inspections, specify the location where this inspection is being conducted. If only one inspection is conducted for your entire project, enter "Entire Site." If necessary, complete additional inspection report forms for each separate inspection location.

Inspection Frequency
Check the box that describes the inspection frequency that applies to you. Note that you may be subject to different inspection frequencies in different areas of your site. If your project does not discharge to a "sensitive water" (i.e., a water impaired for sediment or nutrients, or listed as Tier 2, 2.5, or 3 by your state or tribe) and you are not affected by any of the circumstances described in CGP Part 4.4, then you can choose your frequency based on CGP Part 4.2 – either every 7 calendar days, or every 14 calendar days and within 24 hours of a 0.25-inch storm event. For any portion of your site that discharges to a sensitive water, your inspection frequency for that area is fixed under CGP Part 4.3 at every 7calendar days and within 24 hours of a 0.25-inch storm event. If portions of your site are stabilized, are located in arid, semi-arid, or drought-stricken areas, or are subject to frozen conditions, consult CGP Part 4.4 for the applicable inspection frequency. Check all the inspection frequencies that apply to your project.

Was This Inspection Triggered by a 0.25 Inch Storm Event or the occurrence of runoff from snowmelt sufficient to cause a discharge?
If you were required to conduct this inspection because of a 0.25-inch (or greater) rain event, indicate whether you relied on an on-site rain gauge or a nearby weather station (and where the weather station is located). Also, specify the total amount of rainfall for this specific storm event. If you were required to conduct this inspection because of the occurrence of runoff from snowmelt, then check the appropriate box.

Unsafe Conditions for Inspection
Inspections are not required where a portion of the site or the entire site is subject to unsafe conditions. See CGP Part 4.5. These conditions should not regularly occur, and should not be consistently present on a site. Generally, unsafe conditions are those that render the site (or a portion of it) inaccessible or that would pose a significant probability of injury to applicable personnel. Examples could include severe storm or flood conditions, high winds, and downed electrical wires.

If your site, or a portion of it, is affected by unsafe conditions during the time of your inspection, provide a description of the conditions that prevented you from conducting the inspection and what parts of the site were affected. If the entire site was considered unsafe, specify the location as "Entire site"

Condition and Effectiveness of Erosion and Sediment (E&S) Controls (CGP Part 2.2) (see reverse for instructions)				
Type/Location of E&S Control [Add an additional sheet if necessary]	**Maintenance Needed?***	**Corrective Action Required?***	**Date on Which Maintenance or Corrective Action First Identified?**	**Notes**
1.	☐Yes ☐No	☐Yes ☐No		
2.	☐Yes ☐No	☐Yes ☐No		
3.	☐Yes ☐No	☐Yes ☐No		
4.	☐Yes ☐No	☐Yes ☐No		
5.	☐Yes ☐No	☐Yes ☐No		
6.	☐Yes ☐No	☐Yes ☐No		
7.	☐Yes ☐No	☐Yes ☐No		
8.	☐Yes ☐No	☐Yes ☐No		
9.	☐Yes ☐No	☐Yes ☐No		
10.	☐Yes ☐No	☐Yes ☐No		

*** Note:** The permit differentiates between conditions requiring routine maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition. Corrective actions are triggered only for specific conditions, which include: 1) A stormwater control needs repair or replacement (beyond routine maintenance) if it is not operating as intended; 2) A stormwater control necessary to comply with the permit was never installed or was installed incorrectly; 3) You become aware that the stormwater controls you have installed and are maintaining are not effective enough for the discharge to meet applicable water quality standards or applicable requirements in Part 3.1; 4) One of the prohibited discharges in Part 1.3 is occurring or has occurred; or 5) EPA requires corrective actions as a result of a permit violation found during an inspection carried out under Part 4.8. If a condition on your site requires a corrective action, you must also fill out a corrective action form found at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources. See Part 5 of the permit for more information.

Instructions for Filling Out the "Erosion and Sediment Control" Table

Type and Location of E&S Controls
Provide a list of all erosion and sediment (E&S) controls that your SWPPP indicates will be installed and implemented at your site. This list must include at a minimum all E&S controls required by CGP Part 2.2. Include also any natural buffers established under CGP Part 2.2.1. Buffer requirements apply if your project's earth-disturbing activities will occur within 50 feet of a water of the U.S. You may group your E&S controls on your form if you have several of the same type of controls (e.g., you may group "Inlet Protection Measures", "Perimeter Controls", and "Stockpile Controls" together on one line), but if there are any problems with a specific control, you must separately identify the location of the control, whether maintenance or corrective action is necessary, and in the notes section you must describe the specifics about the problem you observed.

Maintenance Needed?
Answer "yes" if the E&S control requires maintenance due to normal wear and tear in order for the control to continue operating effectively. At a minimum, maintenance is required in the following specific instances: (1) for perimeter controls, whenever sediment has accumulated to half or more the above-ground height of the control (CGP Part 2.2.3.a); (2) where sediment has been tracked-out onto the surface of off-site streets or other paved areas (CGP Part 2.2.4); (3) for inlet protection measures, when sediment accumulates, the filter becomes clogged, and/or performance is compromised (CGP Part 2.2.10); and (4) for sediment basins, as necessary to maintain at least half of the design capacity of the basin (CGP Part 2.2.12.f). Note: In many cases, "yes" answers are expected and indicate a project with an active operation and maintenance program. You should also answer "yes" if work to fix the problem is still ongoing from the previous inspection.

Corrective Action Needed?
Answer "yes" if during your inspection you found any of the following conditions to be present (CGP, Part 5.1): (1) a required E&S control needs repair or replacement (beyond routine maintenance required under Part 2.1.4); (2) a require E&S control was never installed or was installed incorrectly; (3) you become aware that the inadequacy of the E&S control has led to an exceedance of an applicable water quality standard; (4) one of the prohibited discharges in Part 1.3 is occurring or has occurred; or (5) EPA requires corrective action for an E&S control as a result of a permit violation found during an inspection carried out under Part 4.8. If you answer "yes", you must take corrective action and complete a corrective action report, found at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources.. Note: You should answer "yes" if work to fix the problem from a previous inspection is still ongoing.

Date on Which Maintenance or Corrective Action First Identified?
Provide the date on which the condition that triggered the need for maintenance or corrective action was first identified. If the condition was just discovered during this inspection, enter the inspection date. If the condition is a carryover from a previous inspection, enter the original date of the condition's discovery.

Notes
For each E&S control and the area immediately surrounding it, note whether the control is properly installed and whether it appears to be working to minimize sediment discharge. Describe any problem conditions you observed such as the following, and why you think they occurred as well as actions (e.g., maintenance or corrective action) you will take or have taken to fix the problem:

1. Failure to install or to properly install a required E&S control
2. Damage or destruction to an E&S control caused by vehicles, equipment, or personnel, a storm event, or other event
3. Mud or sediment deposits found downslope from E&S controls
4. Sediment tracked out onto paved areas by vehicles leaving construction site
5. Noticeable erosion at discharge outlets or at adjacent streambanks or channels
6. Erosion of the site's sloped areas (e.g., formation of rills or gullies)
7. E&S control is no longer working due to lack of maintenance

For buffer areas, make note of whether they are marked off as required, whether there are signs of construction disturbance within the buffer, which is prohibited under the CGP, and whether there are visible signs of erosion resulting from discharges through the area.

If maintenance or corrective action is required, briefly note the reason. If maintenance or corrective action have been completed, make a note of the date it was completed and what was done. *If corrective action is required, note that you will need to complete a separate corrective action report describing the condition and your work to fix the problem*.

Condition and Effectiveness of Pollution Prevention (P2) Practices (CGP Part 2.3) (see reverse for instructions)				
Type/Location of P2 Practices [Add an additional sheet if necessary]	**Maintenance Needed?***	**Corrective Action Required?***	**Date on Which Maintenance or Corrective Action First Identified?**	**Notes**
1.	☐Yes ☐No	☐Yes ☐No		
2.	☐Yes ☐No	☐Yes ☐No		
3.	☐Yes ☐No	☐Yes ☐No		
4.	☐Yes ☐No	☐Yes ☐No		
5.	☐Yes ☐No	☐Yes ☐No		
6.	☐Yes ☐No	☐Yes ☐No		
7.	☐Yes ☐No	☐Yes ☐No		
8.	☐Yes ☐No	☐Yes ☐No		
9.	☐Yes ☐No	☐Yes ☐No		
10.	☐Yes ☐No	☐Yes ☐No		

*** Note:** The permit differentiates between conditions requiring routine maintenance, and those requiring corrective action. The permit requires maintenance in order to keep controls in effective operating condition. Corrective actions are triggered only for specific conditions, which include: 1) A stormwater control needs repair or replacement (beyond routine maintenance) if it is not operating as intended; 2) A stormwater control necessary to comply with the permit was never installed or was installed incorrectly; 3) You become aware that the stormwater controls you have installed and are maintaining are not effective enough for the discharge to meet applicable water quality standards or applicable requirements in Part 3.1; 4) One of the prohibited discharges in Part 1.3 is occurring or has occurred; or 5) EPA requires corrective actions as a result of a permit violation found during an inspection carried out under Part 4.8. If a condition on your site requires a corrective action, you must also fill out a corrective action form found at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources. See Part 5 of the permit for more information.

Instructions for Filling Out the "Pollution Prevention (P2) Practice" Table

Type and Location of P2 Controls
Provide a list of all pollution prevention (P2) practices that are implemented at your site. This list must include all P2 practices required by Part 2.3, and those that are described in your SWPPP.

Maintenance Needed?
Answer "yes" if the P2 practice requires maintenance due to normal wear and tear in order for the control to continue operating effectively. Note: In many cases, "yes" answers are expected and indicate a project with an active operation and maintenance program.

Corrective Action Needed?
Answer "yes" if during your inspection you found any of the following conditions to be present (CGP, Part 5.1): (1) a required P2 practice needs repair or replacement (beyond routine maintenance required under Part 2.1.4); (2) a require P2 practice was never installed or was installed incorrectly; (3) you become aware that the inadequacy of the P2 practice has led to an exceedance of an applicable water quality standard; (4) one of the "prohibited discharges" listed in CGP Part 1.3 is occurring or has occurred, or (5) EPA requires corrective action for a P2 practice as a result of a permit violation found during an inspection carried out under Part 4.8. If you answer "yes", you must take corrective action and complete a corrective action report (see https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources). Note: You should answer "yes" if work to fix the problem from a previous inspection is still ongoing.

Date on Which Maintenance or Corrective Action First Identified?
Provide the date on which the condition that triggered the need for maintenance or corrective action was first identified. If the condition was just discovered during this inspection, enter the inspection date. If the condition is a carryover from a previous inspection, enter the original date of the condition's discovery.

Notes
For each P2 control and the area immediately surrounding it, note whether the control is properly installed, whether it appears to be working to minimize or eliminate pollutant discharges, and whether maintenance or corrective action is required. Describe problem conditions you observed such as the following, and why you think they occurred, as well as actions you will take or have taken to fix the problem:

1. Failure to install or to properly install a required P2 control
2. Damage or destruction to a P2 control caused by vehicles, equipment, or personnel, or a storm event
3. Evidence of a spill, leak, or other type of pollutant discharge, or failure to have properly cleaned up a previous spill, leak, or other type of pollutant discharge
4. Spill response supplies are absent, insufficient, or not where they are supposed to be located
5. Improper storage, handling, or disposal of chemicals, building materials or products, fuels, or wastes
6. P2 practice is no longer working due to lack of maintenance

If maintenance or corrective action is required, briefly note the reason. If maintenance or corrective action have been completed, make a note of the date it was completed and what was done. *If corrective action is required, note that you will need to complete a separate corrective action report describing the condition and your work to fix the problem*.

Stabilization of Exposed Soil (CGP Part 2.2.14) (see reverse for instructions)			
Stabilization Area **[Add an additional sheet if necessary]**	**Stabilization Method**	**Have You Initiated Stabilization?**	**Notes**
1.		☐ YES ☐ NO If yes, provide date:	
2.		☐ YES ☐ NO If yes, provide date:	
3.		☐ YES ☐ NO If yes, provide date:	
4.		☐ YES ☐ NO If yes, provide date:	
5.		☐ YES ☐ NO If yes, provide date:	

Description of Discharges (CGP Part 4.6.6) (see reverse for instructions)	
Was a stormwater discharge or other discharge occurring from any part of your site at the time of the inspection? ☐ Yes ☐ No **If "yes", provide the following information for each point of discharge:**	
Discharge Location **[Add an additional sheet if necessary]**	**Observations**
1.	Describe the discharge: At points of discharge and the channels and banks of waters of the U.S. in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge? ☐ Yes ☐ No If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:
2.	Describe the discharge: At points of discharge and the channels and banks of waters of the U.S. in the immediate vicinity, are there any visible signs of erosion and/or sediment accumulation that can be attributed to your discharge? ☐ Yes ☐ No If yes, describe what you see, specify the location(s) where these conditions were found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue:

Instructions for Filling Out the "Stabilization of Exposed Soil" Table

Stabilization Area
List all areas where soil stabilization is required to begin because construction work in that area has permanently stopped or temporarily stopped (i.e., work will stop for 14 or more days), and all areas where stabilization has been implemented.

Stabilization Method
For each area, specify the method of stabilization (e.g., hydroseed, sod, planted vegetation, erosion control blanket, mulch, rock).

Have You Initiated Stabilization
For each area, indicate whether stabilization has been initiated.

Notes
For each area where stabilization has been initiated, describe the progress that has been made, and what additional actions are necessary to complete stabilization. Note the effectiveness of stabilization in preventing erosion. If stabilization has been initiated but not completed, make a note of the date it is to be completed. If stabilization has been completed, make a note of the date it was completed. If stabilization has not yet been initiated, make a note of the date it is to be initiated, and the date it is to be completed.

Instructions for Filling Out the "Description of Discharges" Table

You are only required to complete this section if a discharge is occurring at the time of the inspection.

Was a Stormwater Discharge Occurring From Any Part of Your Site At The Time of the Inspection?
During your inspection, examine all points of discharge from your site, and determine whether a discharge is occurring. If there is a discharge, answer "yes" and complete the questions below regarding the specific discharge. If there is not a discharge, answer "no" and skip to the next page.

Discharge Location (repeat as necessary if there are multiple points of discharge)
Location of discharge. Specify the location on your site where the discharge is occurring. The location may be an outlet from a stormwater control or constructed stormwater channel, a discharge into a storm sewer inlet, or a specific point on the site. Be as specific as possible; it is recommended that you refer to a precise point on your site map.

Describe the discharge. Include a specific description of any noteworthy characteristics of the discharge such as color; odor; floating, settled, or suspended solids; foam; oil sheen; and other obvious pollution indicators.

Are there visible signs of erosion or sediment accumulation? At each point of discharge and the channel and streambank in the immediate vicinity, visually assess whether there are any obvious signs of erosion and/or sediment accumulation that can be attributed to your discharge. If you answer "yes", include a description in the space provided of the erosion and sediment deposition that you have found, specify where on the site or in the water of the U.S. it is found, and indicate whether modification, maintenance, or corrective action is needed to resolve the issue.

Contractor or Subcontractor Signature and Certification
(see reverse for instructions)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Contractor or Subcontractor: _____ **Date:**

Printed Name and Affiliation: _____

Operator Signature and Certification
(see reverse for instructions)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Operator or "Duly Authorized Representative": _____ **Date:**

Printed Name and Affiliation: _____

Instructions for Signature/Certification

Each inspection report must be signed and certified to be considered complete.

Contractor or Subcontractor Signature and Certification
Where you rely on a contractor or subcontractor to carry out the inspection and complete the inspection report, you should require the inspector to sign and certify each report. Note that this does not relieve you, the permitted operator, of the requirement to sign and certify the inspection report as well.

Operator Signature and Certification
At a minimum, the inspection report must be signed by either (1) the person who signed the NOI, or (2) a duly authorized representative of that person. The following requirements apply to scenarios (1) and (2):

If the signatory will be the person who signed the NOI for permit coverage, as a reminder, that person must be one of the following types of individuals:

- *For a corporation*: A responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- *For a partnership or sole proprietorship*: A general partner or the proprietor, respectively.
- *For a municipality, state, federal, or other public agency*: Either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

If the signatory will be a duly authorized representative, the following requirements must be met:

- The authorization is made in writing by the person who signed the NOI (see above);
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

Appendix E – Copy of Corrective Action Form

(Note: EPA has developed a sample corrective action form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

2017 Construction General Permit
Corrective Action Report Form – Field Version

Purpose
This Corrective Action Report Form is to assist you in preparing corrective action reports for EPA's 2017 Construction General Permit (CGP). If you are covered under EPA's 2017 CGP, you can use this form to create a corrective action report that complies with the minimum reporting requirements of Part 5.4 of the permit.

You are only required to fill out this form if one of the conditions triggering corrective action in Part 5.1 or 5.3 occurs on your site. Routine maintenance is generally not considered to trigger corrective action. Corrective actions are triggered only for specific conditions that are identified below in the "Overview of Corrective Action Requirements."

If you are covered under a state CGP, this form may be helpful in developing a report that can be used for that permit; however, it will need to be modified to meet the specific requirements of the permit. If your permitting authority requires you to use a specific corrective action report form, you should not use this form.

Notes
While EPA has made every effort to ensure the accuracy of all instructions contained in the Corrective Action Report Form, it is the permit, not the form, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between the Corrective Action Report Form and any corresponding provision of the 2017 CGP, you must abide by the requirements in the permit. EPA welcomes comments on the Corrective Action Report Form at any time and will consider those comments in any future revision of this document. You may contact EPA for CGP-related inquiries at cgp@epa.gov.

Overview of Corrective Action Requirements
Construction operators covered under the 2017 CGP are required to conduct corrective actions and report on progress made in correcting the problem condition(s) in accordance with the following requirements:

Conditions Triggering Corrective Action (Parts 5.1 and 5.3)
Corrective action is required whenever any of the following conditions occur at your site:

- A stormwater control needs repair or replacement (beyond routine maintenance required under Part 2.1.4); or
- A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly; or
- Discharges are causing an exceedance of applicable water quality standards; or
- A Part 1.3 prohibited discharge has occurred; or
- EPA requires corrective action as a result of permit violations found during an inspection carried out under Part 4.8.

Deadlines for Completing Corrective Actions (Part 5.2)
For any condition triggering corrective action:

- You must immediately take all reasonable steps to address the condition (e.g. cleaning up contaminated surfaces so the material(s) is not discharged in subsequent storm events);
- If the problem does not require a new or replacement control or significant repair, you must complete the corrective action by the close of the next business day
- If the problem does require a new or replacement control or significant repair, you must complete corrective action (e.g., installing and making operational any new or modified control, completing repairs) by no later than 7 calendar days from the time of discovery of the condition. If infeasible to complete the installation or repair within 7 calendar days, you must document why it is infeasible and document your schedule for completing the corrective action as soon as practicable. If any of these actions result in changes to the stormwater controls documented in your SWPPP, you must modify your SWPPP within 7 calendar days.

Deadlines for Documenting Corrective Actions in a Report (Part 5.4)
You are required to complete a corrective action report for each corrective action you take in accordance with the following deadlines.

- Within 24 hours of *identifying* the corrective action condition, you must document the following:
  - The condition identified at your site; and
  - The date and time you identified the condition

- Within 24 hours of completing the corrective action, you must document the following:
  - The actions you took to address the condition, and
  - Whether any SWPPP modifications are required.

Instructions for Using This Report Form
This Field Version of the Corrective Action Report Form is intended to be used in the field and filled out by hand. If you will be filling out the Corrective Action Report Form electronically (i.e., you will be typing in your findings), please use the Electronic Version of the Corrective Action Report Form available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources. The Electronic Version includes text fields with instructions for what to enter.

The following tips for using this form will help you ensure that the minimum permit requirements are met:

- **Review the corrective action requirements.** Before you fill out this corrective action report form, read the CGP's Part 5 corrective action requirements. This will ensure that you have a working understanding of the permit's underlying corrective action requirements.

- **Complete a separate report for each condition that triggers corrective action.** For each triggering condition on your site, you will need to fill out a separate corrective action report form.

- **Complete all required text fields.** Fill out all text fields. Only by filling out all fields will the form be compliant with the requirements of the permit. (Note: Where you do not need the number of rows provided in the corrective action report form, you may leave those rows blank. Or, if you need more space to document your findings, you may add an additional sheet.)
- **Sign and certify each corrective action report.** The operator or a duly authorized representative (see Appendix I, Part I.11.2) must sign and certify each corrective action report form for it to be considered complete. Where a contractor or subcontractor carries out your corrective actions, it is recommended that you also have that individual sign and certify the form, in addition to the signature and certification required of the permitted operator. The form includes a signature block for both parties.
- **Include the corrective action report form with your SWPPP.** Once your form is complete, make sure to include a copy of the corrective action report form in your SWPPP in accordance with Part 7.2.7.e of the CGP.
- **Retain copies of all corrective action reports with your records.** You must retain copies of your corrective action reports in your records in accordance with the requirements in Part 5.4.4 of the 2017 CGP. These reports must be retained for at least 3 years from the date your permit coverage expires or is terminated.

Section-by-Section Instructions
You will find specific instructions corresponding to each section of the report form on the reverse side of each page. These instructions were written in order to provide you with more details in terms of what EPA expects to be documented in these reports

Section A – Initial Report (CGP Part 5.4.1) (Complete this section within 24 hours of identifying the condition that triggered corrective action)					
Name of Project		**NPDES ID No.**		**Today's Date**	
Date Problem First Discovered		**Time Problem First Discovered**			
Name and Contact Information of Individual Completing this Form					

What site conditions triggered the requirement to conduct corrective action *(check the box that applies)*:

- ☐ A stormwater control needs repair or replacement (beyond routine maintenance required under Part 2.1.4)
- ☐ A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly
- ☐ A discharge is causing an exceedance of applicable water quality standards
- ☐ A Part 1.3 prohibited discharge has occurred
- ☐ EPA requires corrective action as a result of permit violations found during an EPA inspection carried out under Part 4.8

Provide a description of the problem:

Deadline for completing corrective action *(check the box that applies)*:

- ☐ Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events
- ☐ Complete by close of the next business day when problem does not require a new or replacement control or significant repair
- ☐ No later than 7 calendar days from the time of discovery for problems that require a new or replacement control or significant repair
- ☐ Infeasible to complete the installation or repair within 7 calendar days. Explain why it is infeasible and document schedule for installing control:

Enter date of corrective action completion: _____

Section B – Corrective Action Completion (CGP Part 5.4.2)
(Complete this section no later than 24 hours after completing the corrective action)

Section B.1 – Why the Problem Occurred

Cause(s) of Problem (Add an additional sheet if necessary)	**How You Determined the Cause and the Date You Determined the Cause**
1.	**1.**
2.	**2.**

Section B.2 – Stormwater Control Modifications Implemented to Correct the Problem

List of Stormwater Control Modification(s) Needed to Correct Problem (Add an additional sheet if necessary)	**Date of Completion**	**SWPPP Update Necessary?**	**Notes**
1.		☐Yes ☐No If yes, provide date SWPPP modified:	
2.		☐Yes ☐No If yes, provide date SWPPP modified:	

Instructions for Filling Out the Initial Report (Section A)

You must complete Section A of the report form within 24 hours of discovering the condition that triggered corrective action

Name of Project
Enter the name for the project.

NPDES ID No.
Enter the NPDES ID number that was assigned to your NOI for permit coverage.

Today's Date
Enter the date you completed this form.

Date/Time Problem First Discovered
Specify the date on which the triggering condition was first discovered. Also specify the time of the discovery.

Name/Contact Information
Provide the individual's name, title, and contact information as directed in the form.

Site Condition That Triggered Corrective Action
Under the CGP, corrective action is required when one of 4 triggering conditions occurs at your site or when EPA requires a corrective action as a result of a permit violation found during an EPA inspection. See CGP Parts 5.1 and 5.3. Check the box that corresponds to the condition that triggered this corrective action.

Description of the Site Condition
Provide a summary description of the condition you found that triggered corrective action under CGP Part 5.1 and the specific location where it was found. Be as specific as possible about the location; it is recommended that you refer to a precise point on your site map. If you have already provided this explanation in an inspection report, you can refer to that report.

Deadline for Completing Corrective Action
This deadline is fixed in CGP Part 5.2. For all projects, the deadlines are: (1) immediately take all reasonable steps; (2) by the close of the next business day when the problem does not require significant repair or replacement; (3) no more than 7 calendar days after the date you discovered the problem when the problem does require significant repair or replacement, or (4) if it is infeasible to complete work within the first 7 days, as soon as practicable following the 7th day. If your estimated date of completion falls after the 7-day deadline consistent with (3), above, explain (a) why you believe it is infeasible to complete work within 7 days, and (b) why the date you have established for making the new or modified stormwater control operational is the soonest practicable timeframe.

Instructions for Filling Out the Corrective Action Completion Table (Section B)

You must complete Section B of the report form no later than 24 hours after completing the correction action.

Section B.1 – Why the Problem Occurred
After you have had the opportunity to examine the problem more closely, provide details as to what you believe to be the cause of the problem, and specify the follow-up actions you took (along with the dates of such actions) to diagnose the problem. This is consistent with CGP Part 5.4.2.

Section B.2 – Stormwater Control Modifications Implemented
Provide a list of modifications you made to your stormwater controls to correct the problem and the date you completed such work. Keep in mind that your work must be completed within the timeline specified in Section A for the completion of corrective action work.

Also, if a SWPPP modification is necessary consistent with Part 7.4.1.a in order to reflect changes implemented at your site, indicate the date you modified your SWPPP. Keep in mind that SWPPP changes must be made within 7 days of discovering the problem that triggered this corrective action.

Space is provided for you to include additional notes or observations regarding the change that you implemented at your site to correct the problem.

Section C –Signature and Certification (CGP Part 5.4.3)

Section C.1 – Contractor or Subcontractor Signature and Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Contractor or Subcontractor: _____

Date:

Printed Name and Affiliation: _____

Section C.2 – Operator Signature and Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Operator or "Duly Authorized Representative": _____

Date:

Printed Name and Affiliation: _____

Instructions for Signature and Certification (Section C)

Each corrective action report must be signed and certified to be considered complete.

Section C.1 – Contractor or Subcontractor Signature and Certification
Where you rely on a contractor or subcontractor to complete this report and the associated corrective action, you should require the individual(s) to sign and certify each report. Note that this does not relieve you, the permitted operator, of the requirement to sign and certify the report as well.

Section C.2 – Operator Signature and Certification
At a minimum, the corrective action report form must be signed by either (1) the person who signed the NOI, or (2) a duly authorized representative of that person. The following requirements apply to scenarios (1) and (2):

If the signatory will be the person who signed the NOI for permit coverage, as a reminder, that person must be one of the following types of individuals:

- *For a corporation*: A responsible corporate officer. For the purpose of this subsection, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- *For a partnership or sole proprietorship*: A general partner or the proprietor, respectively.
- *For a municipality, state, federal, or other public agency*: Either a principal executive officer or ranking elected official. For purposes of this subsection, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

If the signatory will be a duly authorized representative, the following requirements must be met:

- The authorization is made in writing by the person who signed the NOI (see above);
- The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- The signed and dated written authorization is included in the SWPPP. A copy must be submitted to EPA, if requested.

Appendix F – *Sample* SWPPP Amendment Log

Instructions (see CGP Part 7.4):

- Create a log here of changes and updates to the SWPPP. You may use the table below to track these modifications.
- SWPPP modifications are required pursuant to CGP Part 7.4.1 in the following circumstances:
  - ✓ Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP;
  - ✓ To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;
  - ✓ If inspections or investigations determine that SWPPP modifications are necessary for compliance with this permit;
  - ✓ Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet requirements of the permit; and
- To reflect any revisions to applicable federal, state, tribal, or local requirements that affect the stormwater control measures implemented at the site.
- If applicable, if a change in chemical treatment systems or chemically-enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	

Appendix G – *Sample* Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: _____

Project Title: _____

Operator(s): _____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

_____

_____

Signature: _____

Title: _____

Date: _____

Appendix H – *Sample* Grading and Stabilization Activities Log

Date Grading Activity Initiated	**Description of Grading Activity**	**Description of Stabilization Measure and Location**	**Date Grading Activity Ceased** (Indicate Temporary or Permanent)	**Date When Stabilization Measures Initiated**
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE

Appendix I – *Sample* SWPPP Training Log

Stormwater Pollution Prevention Training Log

Project Name:

Project Location:

Instructor's Name(s):

Instructor's Title(s):

Course Location: _____ Date: _____

Course Length (hours): _____

Stormwater Training Topic: *(check as appropriate)*

- ☐ **Sediment and Erosion Controls**
- ☐ **Stabilization Controls**
- ☐ **Pollution Prevention Measures**
- ☐ **Emergency Procedures**
- ☐ **Inspections/Corrective Actions**

Specific Training Objective:_____

_____

Attendee Roster: *(attach additional pages as necessary)*

No.	Name of Attendee	Company
1		
2		
3		
4		
5		
6		
7		
8		

Appendix J – *Sample* Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit (CGP), at the _____ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, state, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix I of EPA's CGP, and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix I.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

Appendix K – Endangered Species Documentation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Missouri Ecological Services Field Office
101 Park Deville Drive
Suite A
Columbia, MO 65203-0057
Phone: (573) 234-2132 Fax: (573) 234-2181

In Reply Refer To: May 25, 2021
Consultation Code: 03E14000-2021-SLI-1692
Event Code: 03E14000-2021-E-04475
Project Name: Barry-Lawrence Regional Library

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. N**ote that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days.** The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance

Refer to the Midwest Region S7 Technical Assistance website for step-by-step instructions for making species determinations and for specific guidance on the following types of projects: projects in developed areas, HUD, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

Federally Listed Bat Species

Indiana bats, gray bats, and northern long-eared bats occur throughout Missouri and the information below may help in determining if your project may affect these species.

Gray bats - Gray bats roost in caves or mines year-round and use water features and forested riparian corridors for foraging and travel. If your project will impact caves, mines, associated riparian areas, or will involve tree removal around these features – particularly within stream corridors, riparian areas, or associated upland woodlots –gray bats could be affected.

Indiana and northern long-eared bats - These species hibernate in caves or mines only during the winter. In Missouri the hibernation season is considered to be November 1 to March 31. During the active season in Missouri (April 1 to October 31) they roost in forest and woodland habitats. Suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches diameter at breast height (dbh) for Indiana bat, and ≥3 inches dbh for northern long-eared bat, that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Tree species often include, but are not limited to, shellbark or shagbark hickory, white oak, cottonwood, and maple. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, Indiana bats or northern long-eared bats could be affected.

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas;
- Trees found in highly-developed urban areas (e.g., street trees, downtown areas);
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees; and
- A stand of eastern red cedar shrubby vegetation with no potential roost trees.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of “There are no listed species found within the vicinity of the project,” then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.

2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see #3 below) – then project proponents can conclude the proposed activities **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species through the S7 Technical Assistance website.

3. If IPac returns a result that one or more federally listed bat species (Indiana bat, northern long-eared bat, or gray bat) are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** these bat species **IF** one or more of the following activities are proposed:

a. Clearing or disturbing suitable roosting habitat, as defined above, at any time of year;
b. Any activity in or near the entrance to a cave or mine;
c. Mining, deep excavation, or underground work within 0.25 miles of a cave or mine;
d. Construction of one or more wind turbines; or
e. Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on listed bat species. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.

If any of the above activities are proposed in areas where one or more bat species may be present, project proponents can conclude the proposed activities **may affect** one or more bat species. We recommend coordinating with the Service as early as possible during project planning. If your project will involve removal of over 5 acres of suitable forest or woodland habitat, we recommend you complete a Summer Habitat Assessment prior to contacting our office to expedite the consultation process. The Summer Habitat Assessment Form is available in Appendix A of the most recent version of the Range-wide Indiana Bat Summer Survey Guidelines.

Other Trust Resources and Activities

Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area

please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

Next Steps

Should you determine that project activities **may affect** any federally listed species or trust resources described herein, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

If you have not already done so, please contact the Missouri Department of Conservation (Policy Coordination, P. O. Box 180, Jefferson City, MO 65102) for information concerning Missouri Natural Communities and Species of Conservation Concern.

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Karen Herrington

Attachment(s):

- Official Species List

- USFWS National Wildlife Refuges and Fish Hatcheries
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Missouri Ecological Services Field Office
101 Park Deville Drive
Suite A
Columbia, MO 65203-0057
(573) 234-2132

Project Summary

Consultation Code: 03E14000-2021-SLI-1692
Event Code: 03E14000-2021-E-04475
Project Name: Barry-Lawrence Regional Library
Project Type: DEVELOPMENT
Project Description: Construction of a new regional library center for Barry and Lawrence County located at the corner of Old Airport Road and Park Street. Construction activities to include the erection of a new 2,300 SF building, paving of associated parking lot, and the installation and connection of required utility services.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@36.9301903,-93.90206127867367,14z

Counties: Lawrence County, Missouri

Endangered Species Act Species

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Gray Bat *Myotis grisescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Fishes

NAME	STATUS
Ozark Cavefish *Amblyopsis rosae* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6490	Threatened

Clams

NAME	STATUS
Neosho Mucket *Lampsilis rafinesqueana* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3788	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

Appendix L – Historic Properties Documentation

Appendix M – Rainfall Gauge Recording

Use the table below to record the rainfall gauge readings at the beginning and end of each work day. An example table follows.

Month/Year			Month/Year			Month/Year		
Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
2			2			2		
3			3			3		
4			4			4		
5			5			5		
6			6			6		
7			7			7		
8			8			8		
9			9			9		
10			10			10		
11			11			11		
12			12			12		
13			13			13		
14			14			14		
15			15			15		
16			16			16		
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18			18			18		
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21			21			21		
22			22			22		
23			23			23		
24			24			24		
25			25			25		
26			26			26		
27			27			27		
28			28			28		
29			29			29		
30			30			30		
31			31			31		

Example Rainfall Gauge Recording

April 2017			May 2017			June 2017		
Day	7:00 am	4:400 pm	Day	7:00 am	4:00 pm	Day	7:00 am	4:00 pm
1	--	--	1	0.2	0	1	0	0.4
2	--	--	2	0	0	2	0	0
3	0	0	3	0.1	0.3	3	--	--
4	0	0.3	4	0	0	4	--	--
5	0	0	5	0	0	5	0	0

In this example (for only partial months), 0.25-inch rainfall inspections would have been conducted on April 4 and June 1.

Appendix N – Best Management Practices

COMPOST FILTER SOCKS

DEFINITION & PURPOSE

A compost filter sock is a mesh tube filled with composted material used to control sediment through settling and filtration.

CONDITIONS FOR EFFECTIVE USE

Compost filter socks are generally placed along the perimeter of a site, at intervals along a slope, or as ditch checks to slow down runoff and retain sediment, allowing cleaned water to flow through. Compost material shall be screened ≤ 2 inches. Filter socks generally come in 8", 12", and 18" diameters. Compost filter socks can be used for sheet flow and small concentrated flows. Common industry practice is that drainage areas should not exceed 0.25 acres per 100 feet of sock length and flow should not exceed one cubic foot per second. Manufacturer's specifications should be followed for selecting the sock diameter. See MDNR Guide Section 6-167 for additional guidance.

INSTALLATION/CONSTRUCTION PROCEDURES

Install prior to disturbance of the site. Follow manufacturer's specifications. See Typical Detail.

OPERATION & MAINTENANCE PROCEDURES

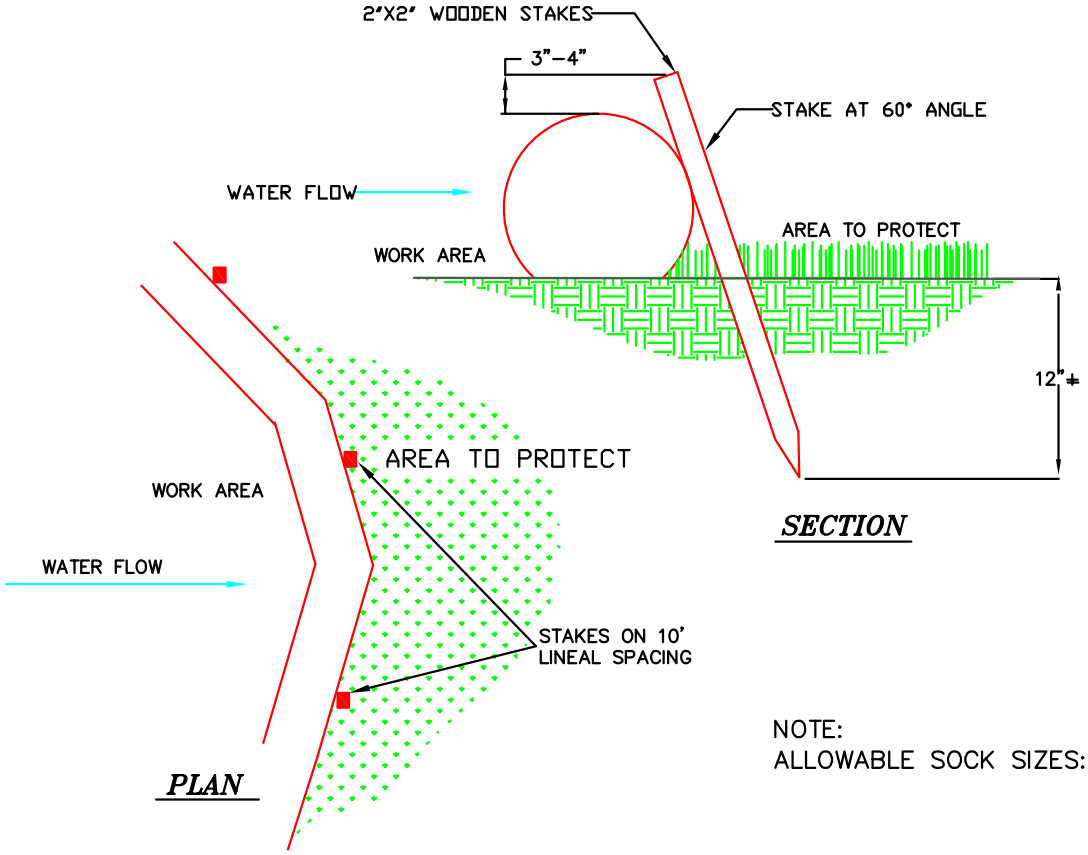
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Prevent vehicles and machinery from damaging sock. Remove accumulated sediment generally when it reaches half the height of the sock, replace broken stakes, and repair or replace sections that are torn.

SITE CONDITIONS FOR REMOVAL

Removal of sock can occur after permanent vegetation is established. The mesh material can be cut open and removed, leaving the compost to degrade naturally.

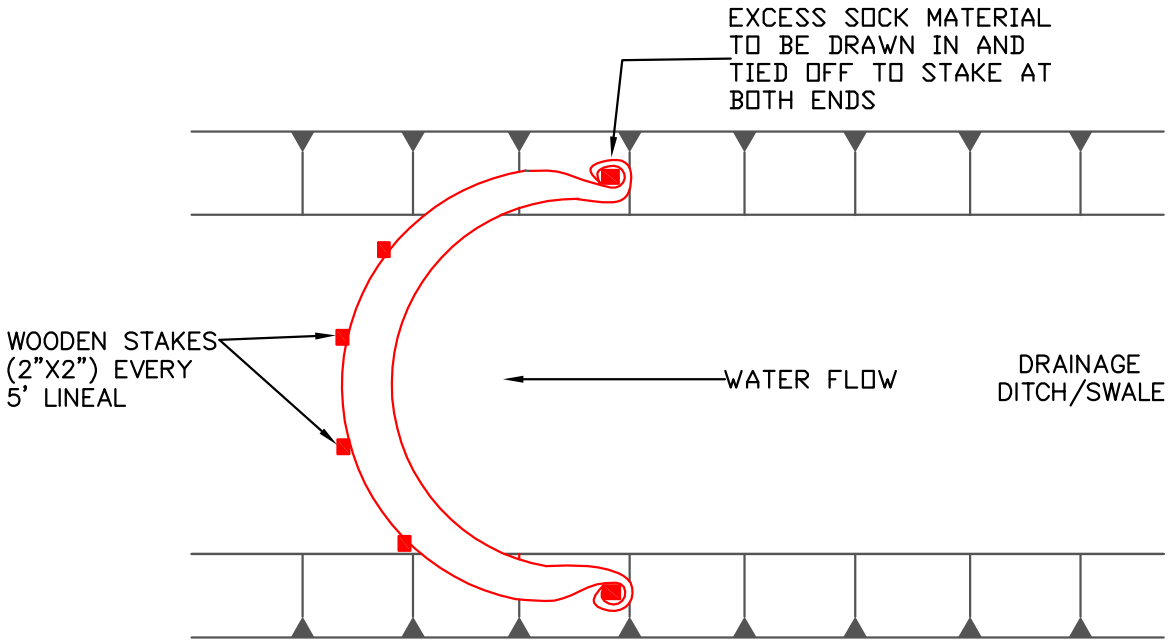
ROBUST ALTERNATIVES

- Tie Down Composted River Sock
- Silt fence



NOTE:
ALLOWABLE SOCK SIZES: 8", 12" & 24"

PERIMETER CONTROL



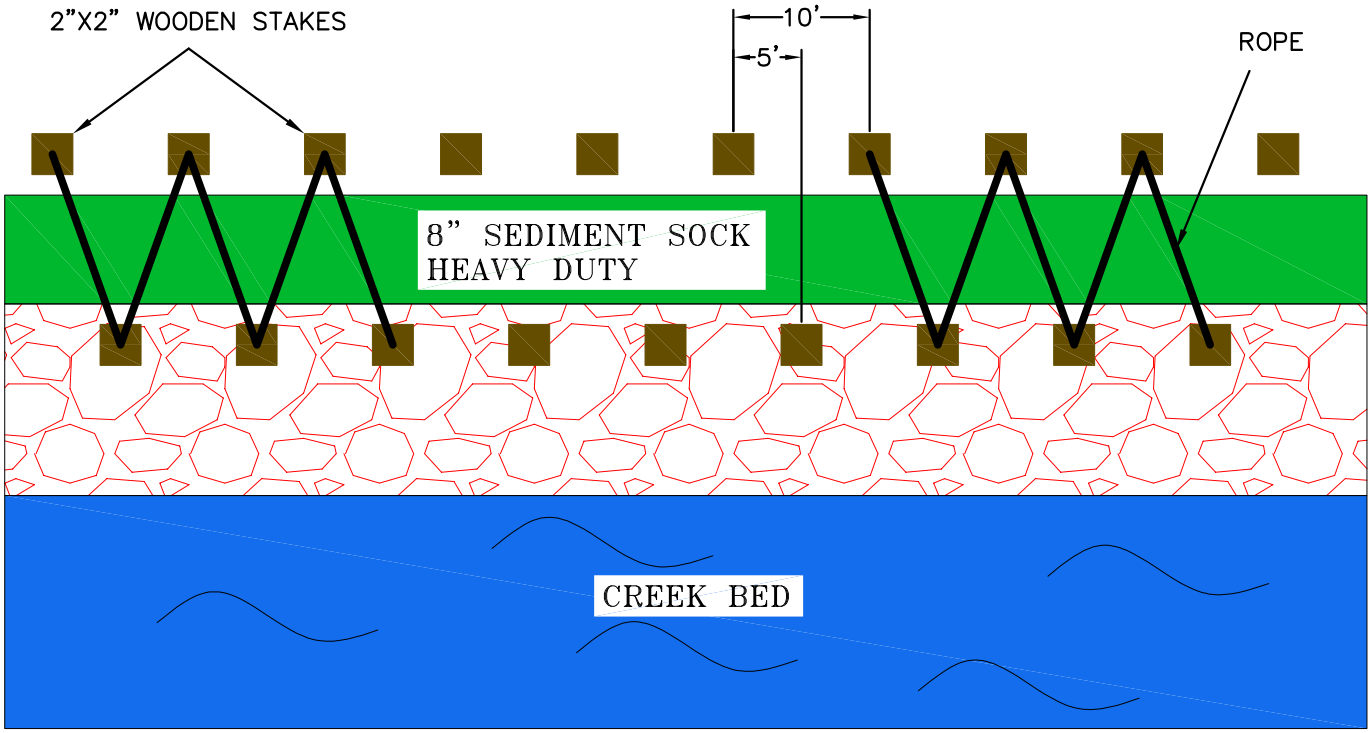
DITCH CHECK

NOTE: FOLLOW MANUFACTURER'S SPECIFICATION

Modified from Filtrexx Standard Specification and Design Manual, Version 5.0, 2006

NTS

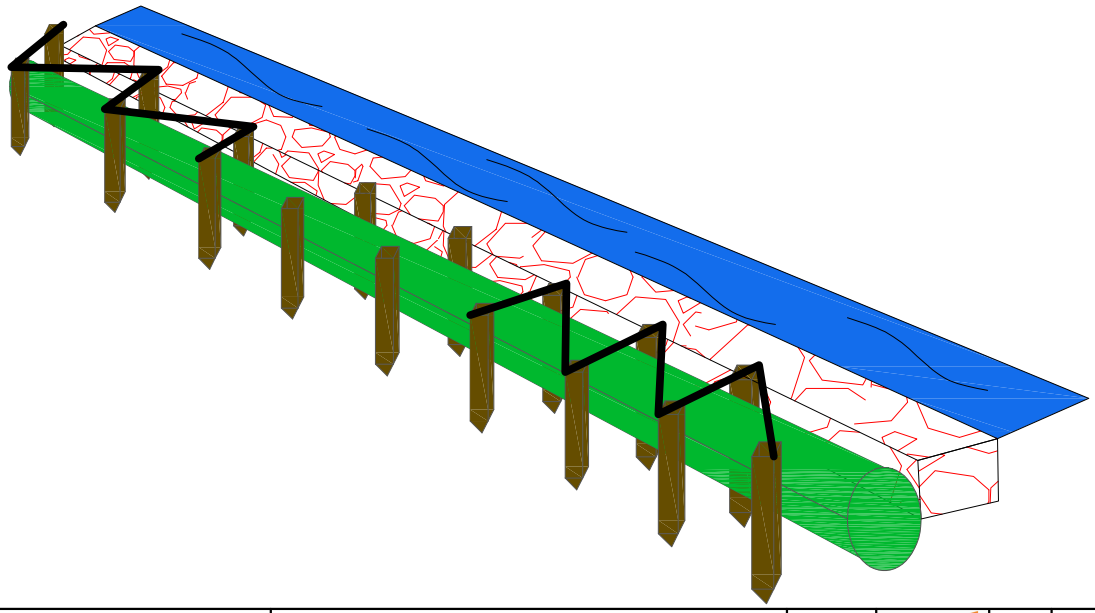
City of Springfield, Missouri	Department of Public Works Storm Water Services Division	CITY OF Springfield PUBLIC WORKS	CITY OF Springfield ENVIRONMENTAL SERVICES
COMPOST FILTER SOCK		Issued: 10-01-2008 Revised: 06-01-2014	



PERIMETER CONTROL

NOTES:

- USE 2"X2"X2.5" WOODEN STAKES SPACED EVERY TEN FEET, OFFSET EVERY 5 FEET ON OPPOSITE SIDE OF SOCK.
- TIE ROPE TO FOUR STAKES ALTERNATING SIDE.
- LEAVE 30 FEET BETWEEN TIED STAKES



NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division	CITY OF Springfield PUBLIC WORKS	CITY OF Springfield ENVIRONMENTAL SERVICES
COMPOST FILTER SOCK ROBUST METHOD		Issued: 06–01–2014 Revised:	

CONCRETE WASH-OUT PIT

DEFINITION & PURPOSE

Concrete wash-out pits are used to contain concrete wash-out when truck chutes, drums and/or hoses are rinsed out after delivery to construction site. Disposal can occur when concrete wash-out becomes a solid. Concrete wash-out water is a pollutant because of the high pH level and chemical additives in the wash-out. Concrete wash-out management prevents the contamination of stormwater with high Ph and additives that may cause adverse impact to water quality.

CONDITIONS FOR EFFECTIVE USE

Concrete wash-out pits must be implemented on construction projects where concrete slurries are generated. Wash-out should be located a minimum of 50 feet from storm drains, ditches, and 100 feet from classified streams, losing streams or sinkholes. Design concrete wash-out pits to sufficiently hold all liquid and concrete waste. Plastic liner should be a minimum of 10 mil. polyethylene sheeting. See MDNR Guide Section 6-63 for additional guidance.

INSTALLATION/CONSTRUCTION PROCEDURES

Install concrete wash-out pits prior to concrete pouring activities. See Typical Detail.

OPERATION & MAINTENANCE PROCEDURES

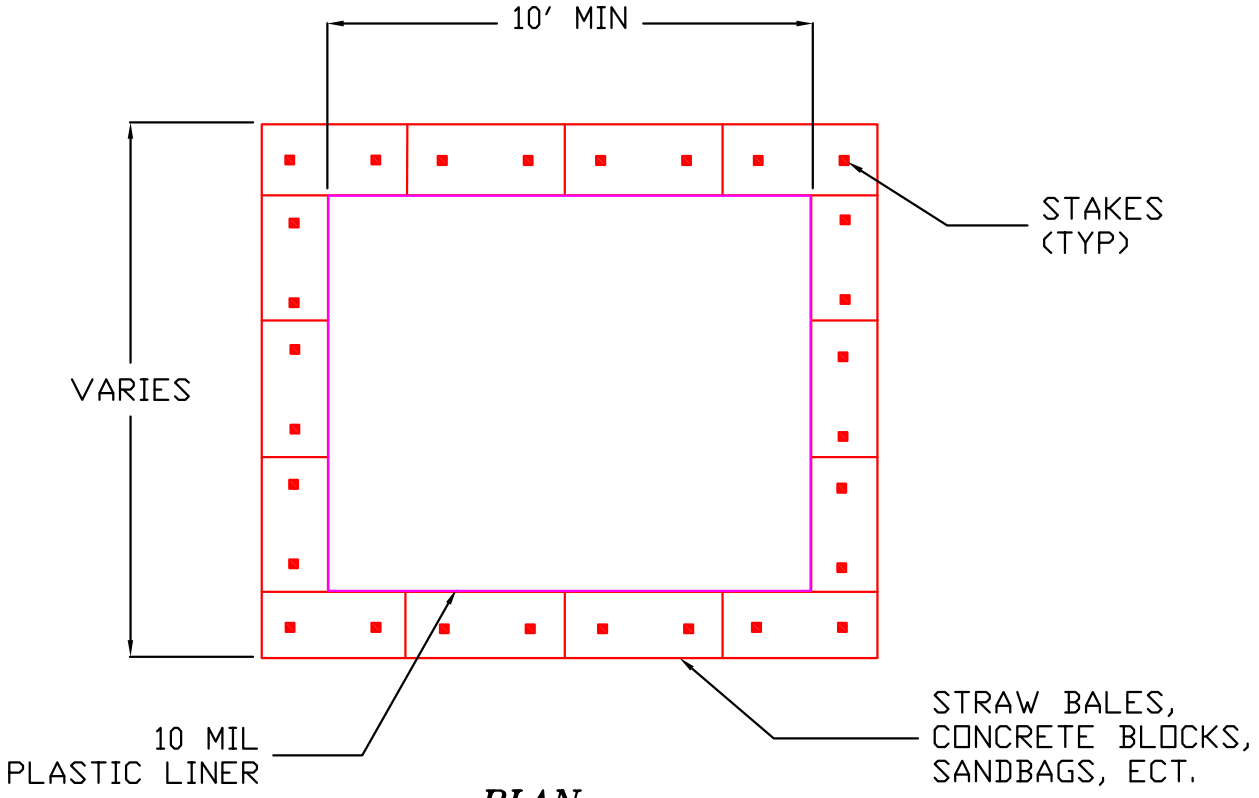
Inspect every week and within 48 hours after a rain event that causes stormwater runoff to occur on-site. Remove and dispose of solid concrete material. Wash-out facilities must be cleaned when volume reaches 75% of capacity. Cover the concrete wash-out pit before predicted rain events to prevent overflow.

SITE CONDITIONS FOR REMOVAL

Remove concrete wash-out pit when concrete wash-out activity ceases.

ALTERNATIVES

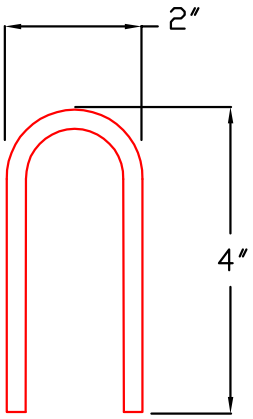
- Return unwanted concrete back to concrete batch plant to wash-out, proprietary disposal boxes, roll-off dumpster

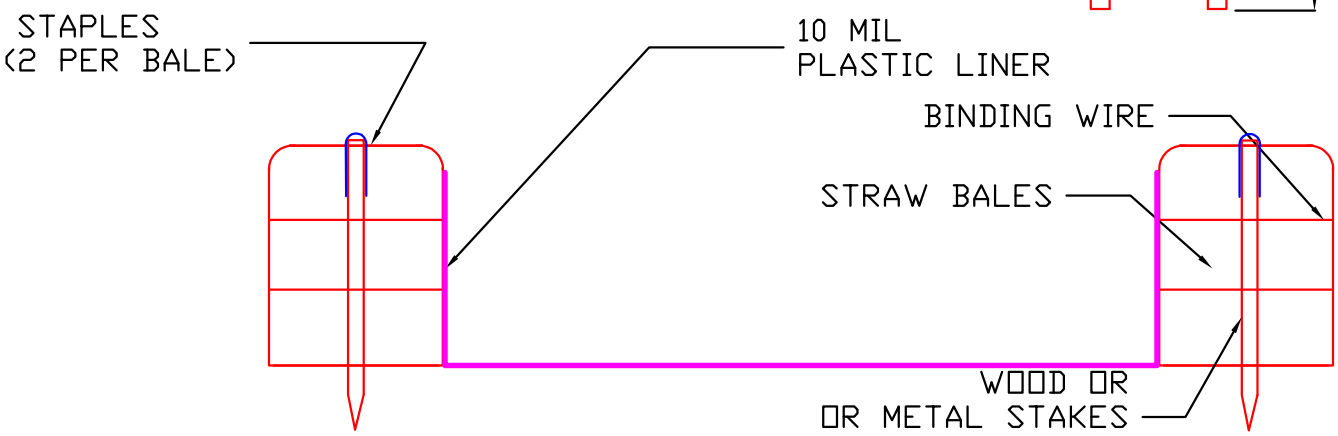


PLAN

NOTES:

1. ACTUAL LAYOUT DETERMINED IN FIELD
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY





SECTION

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division		
CONCRETE WASHOUT–ABOVE GRADE		Issued: 10–01–2008 Revised: 06–01–2014	

CONSTRUCTION EXIT

DEFINITION & PURPOSE

A stabilized exit to a construction site is designed to minimize the amount of sediment tracked from the site on vehicles and equipment. Mud and sediment fall off of tires as they bounce along the stabilized entrance.

CONDITIONS FOR EFFECTIVE USE

Limit the number of points of ingress/egress and locate them where it is safe for construction vehicles and equipment to access public road. Avoid placing construction exit in low areas, where stormwater can accumulate and discharge off site. If possible, locate where permanent roads will eventually be constructed. See MDNR Guide Sections 6-7 through 6-15 for construction exit and robust alternatives.

INSTALLATION/CONSTRUCTION PROCEDURES

Install prior to the start of construction. Properly grade and compact each construction entrance/exit to prevent runoff from leaving the site. Install culvert under entrance if needed to maintain positive drainage. Install woven geotextile fabric and cover with 3 to 6" aggregate to a depth of 6". Construction exit should have a length of 50' and a turn radius of 25' or full width of roadway. All contractors, subcontractors, and suppliers should be instructed to utilize construction entrance/exit before entering or exiting unstable areas.

OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Add a new lift of rock, or turn stones when voids become inundated with sediment and pad becomes smooth. Keep all temporary roadway ditches clear. Immediately remove any mud, rock or debris tracked onto paved surfaces. Use a street sweeper adjacent with the construction exit to reduce track out from site.

SITE CONDITIONS FOR REMOVAL

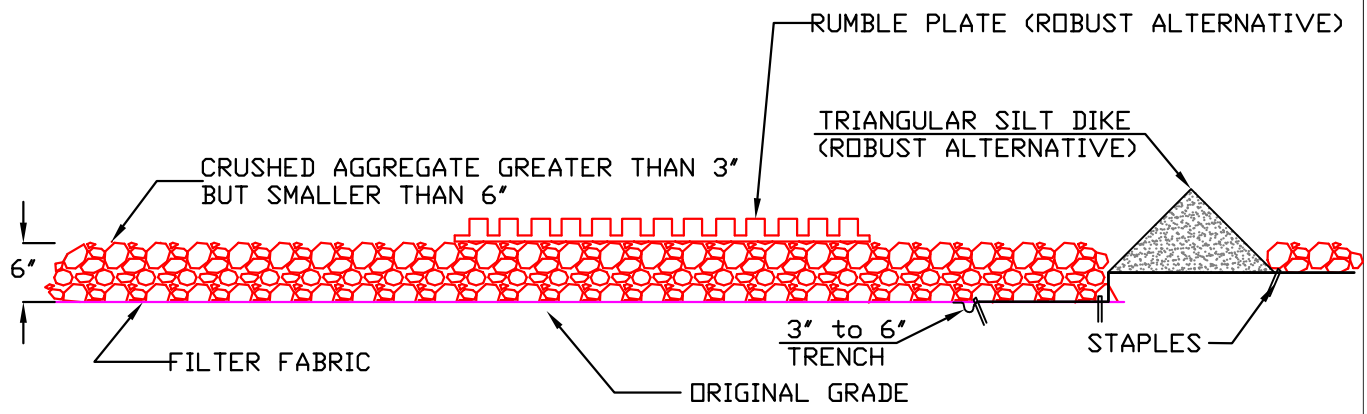
Remove exit when vehicles and equipment will no longer access unpaved areas.

ROBUST ALTERNATIVES

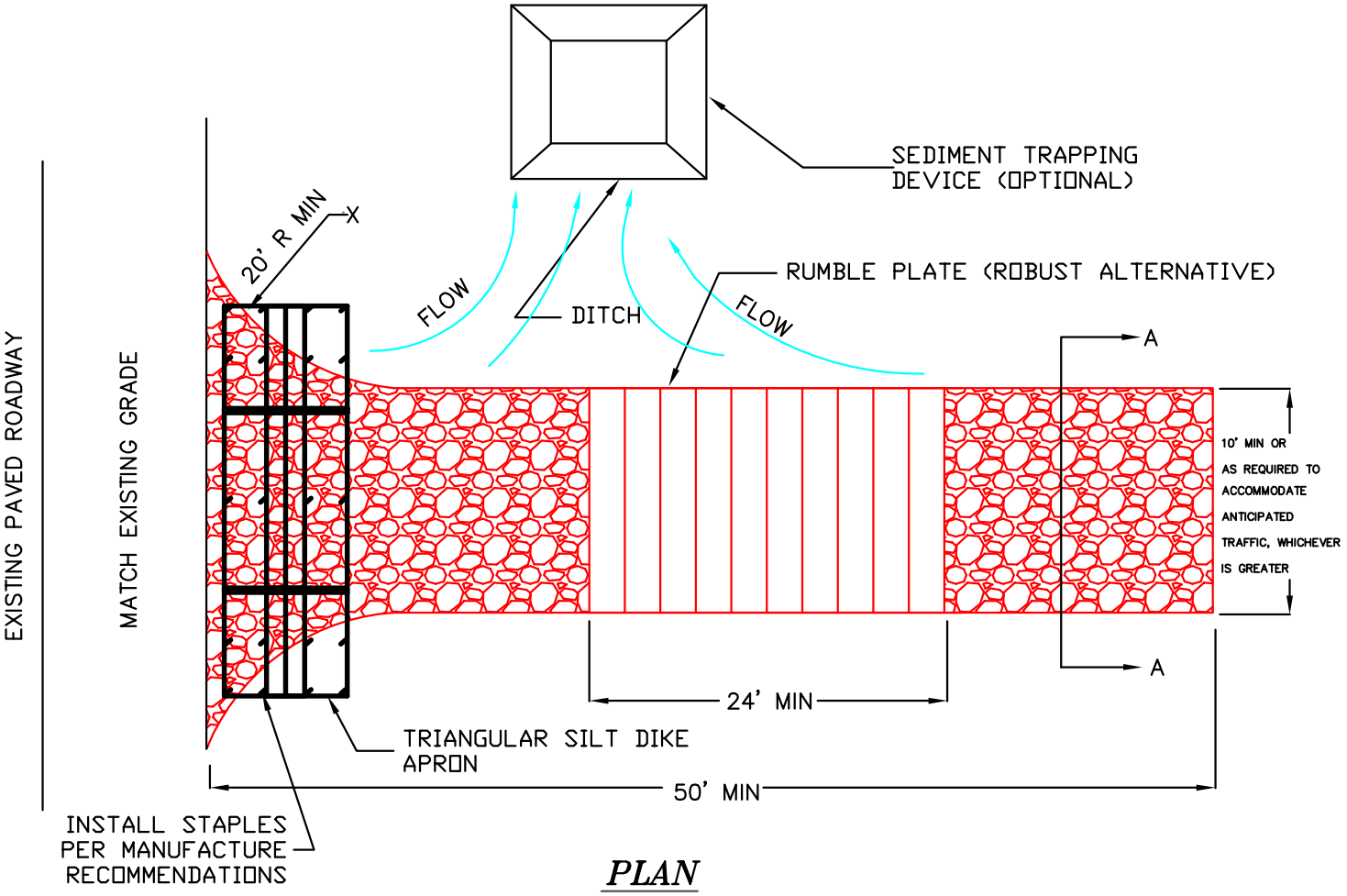
- Rumble Plate, Bamboo Mat, Automated Wheel Wash Systems

COMPANION BMPs

- Triangular Foam Perimeter control
- Street cleaning
- Stabilized gravel access road



SECTION A–A

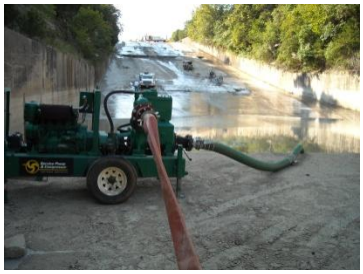


PLAN

Modified from California Storm Water BMP Handbook

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division		
CONSTRUCTION ENTRANCE/EXIT		Issued: 10–01–2008 Revised: 06–01–2014	



DEWATERING OPERATIONS

DEFINITION & PURPOSE

Dewatering operations are practices using dewatering bags, filter socks, rock bags or a suction pump with skimmer to manage the discharge of pollutants when stormwater and non-stormwater must be removed from a construction site. Water cannot be directly pumped into storm sewer system, streams, or lakes without first going through a sediment control BMP.

CONDITIONS FOR EFFECTIVE USE

These practices are implemented for removing standing stormwater and allowable non-stormwater discharges from construction sites. Non-stormwater removal includes groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area and are authorized discharges in the state land disturbance permit. Site conditions will dictate the design. A dewatering plan should be submitted as part of the SWPPP detailing the location of dewatering activities, equipment, BMPs and discharge point. Additional permits or special permission from other agencies may be required for some dewatering operations. It is best if stormwater is allowed to settle in the trap or basin for a minimum of 24 hours after the storm event. The intake hose of the dewatering pump should be elevated off the bottom. Dewatering discharges must not cause erosion at the discharge point. See MDNR Guide Section 6-207 for additional guidance.

INSTALLATION/CONSTRUCTION PROCEDURES

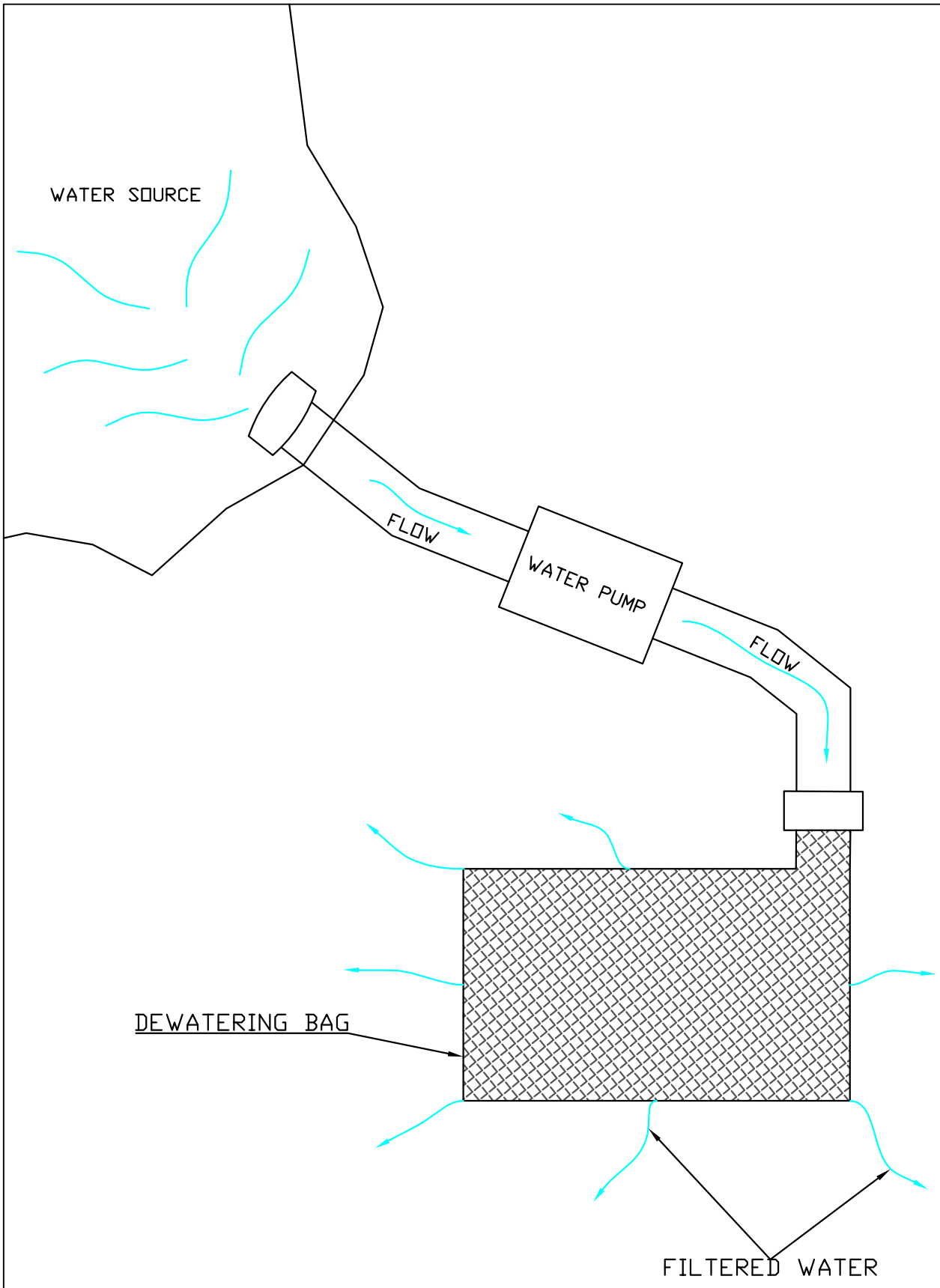
Implement the dewatering plan detailed in the SWPPP as needed to dewater work areas.

OPERATION & MAINTENANCE PROCEDURES

Dewatering operations should be closely attended when in use to ensure BMPs are functioning properly. Accumulated sediment removed during the maintenance of a dewatering device can be incorporated into the site.

SITE CONDITIONS FOR REMOVAL

Remove the dewatering operation when dewatering the site is no longer necessary.



Modified from California Stormwater BMP Handbook

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division	CITY OF Springfield PUBLIC WORKS	CITY OF Springfield ENVIRONMENTAL SERVICES

DEWATERING BAG

Issued: 10–01–2008

Revised: 06–01–2014

DUST CONTROL/ WIND EROSION

DEFINITION & PURPOSE

Practices of controlling wind-borne dust include phasing, preservation of trees and existing vegetation, minimization of soil disturbance, mulching, watering, wind barriers, and soil binders.

CONDITIONS FOR EFFECTIVE USE

Phase work to the extent practical to minimize the amount of area disturbed at one time (see Phasing/Sequencing). Preservation of grass and trees and the use of solid board fences may also serve as wind barriers. For areas not subjected to traffic, vegetation provides the most practical method of dust control and should be established as early as possible. Effectiveness of application of water, adhesives, and chemical treatment depends on soil, temperature, humidity and wind velocity. See MDNR Guide Section 6-103 for additional guidance.

INSTALLATION/CONSTRUCTION PROCEDURES

Use dust control when clearing and grading activities create blowing dust, especially during periods of dry weather. Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution. Place barriers at right angles to prevailing wind at intervals of about 10 times their height to control soil blowing. Paved areas that have soil on them from construction sites should be cleaned with street sweeper. Mulching offers a fast and effective means of controlling dust when properly applied. Binders and tackifiers should be used on organic mulches. NOTE: If calcium chloride or spray-on adhesives are used for dust control, a permit may be required from MDNR. Follow manufacturer's specifications for binders and tackifiers.

OPERATION & MAINTENANCE PROCEDURES

Check areas where mulch or binders have been applied for dust control and adjust/reapply as needed, according to manufacturer's specifications.

SITE CONDITIONS FOR REMOVAL

Dust control practices can be terminated when stabilization has been achieved.

ROBUST ALTERNATIVES

- Binders and Tackifiers

EROSION CONTROL BLANKETS

DEFINITION & PURPOSE

An erosion control blanket (ECB) is a blanket of synthetic or natural fibers to protect soil from the erosive impact of precipitation and overland flow, typically on slopes and in channels. ECBs also retain moisture and facilitate establishment of vegetation. Erosion control blankets are also sometimes referred to as Rolled Erosion Control Products (RECPs).

CONDITIONS FOR EFFECTIVE USE

Factors in the selection of ECB include soil conditions, steepness and length of slope, sheer stress, and type and duration of protection needed to establish desired vegetation. Products are available for a variety of uses and longevity, typically from 3 months to 36 months. Manufacturer's specifications should be followed in ECB selection. See MDNR Guide Section 6-97 for general guidance on ECB use and selection.

INSTALLATION/CONSTRUCTION PROCEDURES

The type of ECB shown on the plans should be installed immediately after completion of a phase of grading and/or seeding. Follow manufacturer's specifications for installation, particularly noting requirements for check slots, fastening devices (staples), and the need for firm contact with soil. See Manufacturer's Detail or Typical Detail.

OPERATION & MAINTENANCE PROCEDURES

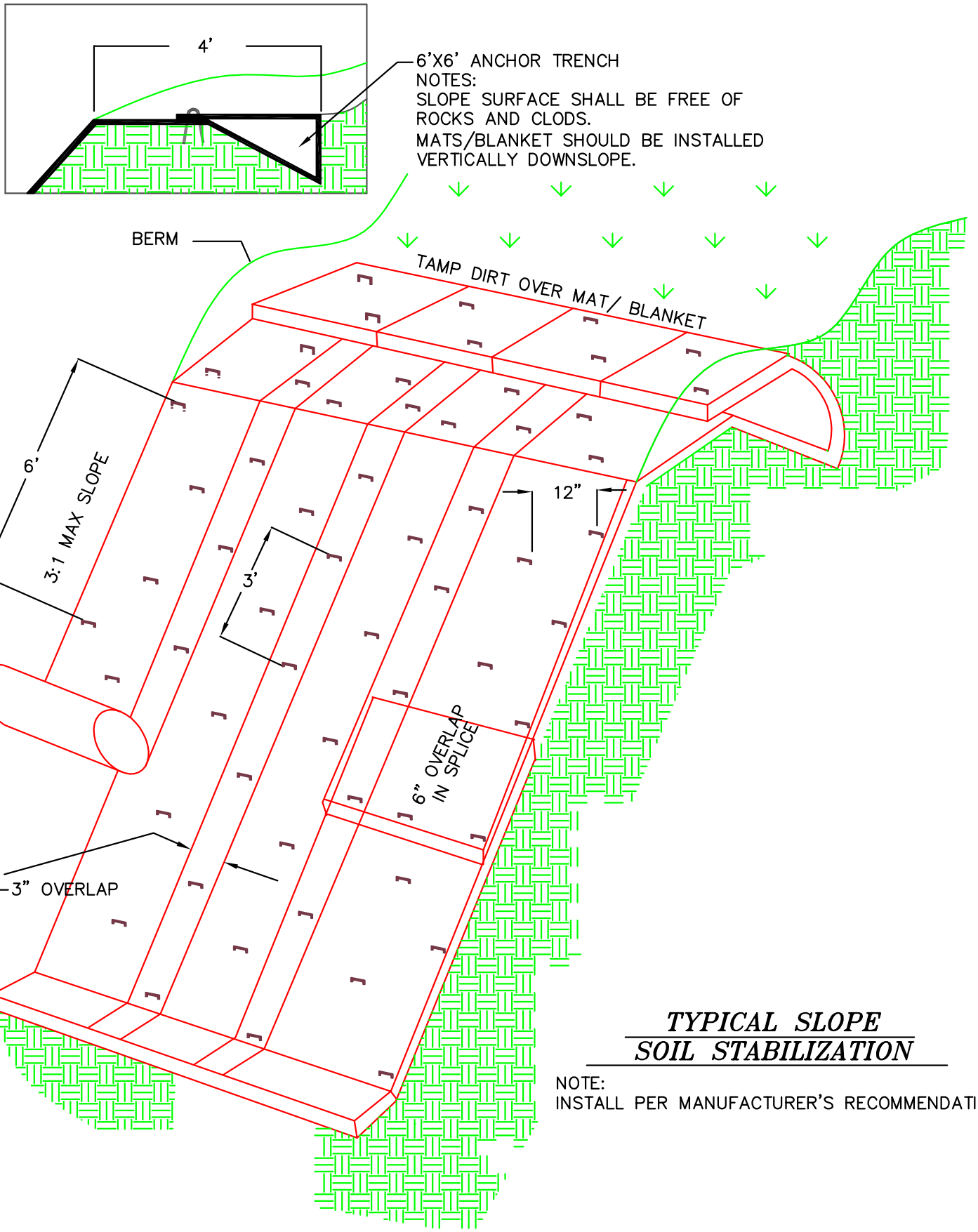
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site until adequate vegetation is established. Repair erosion and/or undermining at top of slope. Repair undermining beneath blankets. Pull back the blankets, fill and compact eroded area, re-seed and then firmly secure the blankets. Reposition or replace blankets that have moved along the slope or have been damaged.

SITE CONDITIONS FOR REMOVAL

ECB is typically left in place and designed to degrade over time.

ROBUST ALTERNATIVES

- Turf reinforcement mat



TYPICAL SLOPE SOIL STABILIZATION

NOTE:
INSTALL PER MANUFACTURER'S RECOMMENDATION

Modified from California Stormwater BMP Handbook

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division	CITY OF Springfield PUBLIC WORKS	CITY OF Springfield ENVIRONMENTAL SERVICES
EROSION CONTROL BLANKETS		Issued: 10–01–2008 Revised: 06–01–2014	

FIBER ROLLS/WATTLES

DEFINITION & PURPOSE

Fiber rolls or straw wattles are a rolled erosion control product filled with straw, flax, rice, coconut fiber material, or composted material. Each roll is wrapped with UV-degradable polypropylene netting or with biodegradable materials like burlap, jute, or coir. These devices are slope dissipaters that reduce velocity of runoff as sheet flow and catch sediment on steep slopes.

CONDITIONS FOR EFFECTIVE USE

Fiber rolls can be used in areas of low shear stress including: along the toe, top, face, and at grade breaks on exposed and erodible slopes to shorten slope length and spread runoff as sheet flow, at the end of a downward slope where it transitions to a steeper slope, along the perimeter of a project (less than 1/3 acre) or down-slope of a stockpile, and down-slope of other exposed soil areas. See MDNR Guide Section 6-195 for additional guidance.

INSTALLATION/CONSTRUCTION PROCEDURES

Install fiber roll immediately after rough grading and prior to seeding or mulching. On slopes, install fiber rolls along the contour with a slight downward angle at the end of each row to prevent ponding at the midsection. Turn the ends of each fiber roll upslope (like a j-hook) to prevent runoff from flowing around the roll. Determine using manufacturer's specification the vertical spacing for slope installations. Straw wattles can float or move if not properly staked and trenched in.

OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on site. Remove sediment accumulation when it reaches ½ the height of the roll/wattle. Repair or replace split, torn, unraveled, or slumping fiber rolls.

SITE CONDITIONS FOR REMOVAL

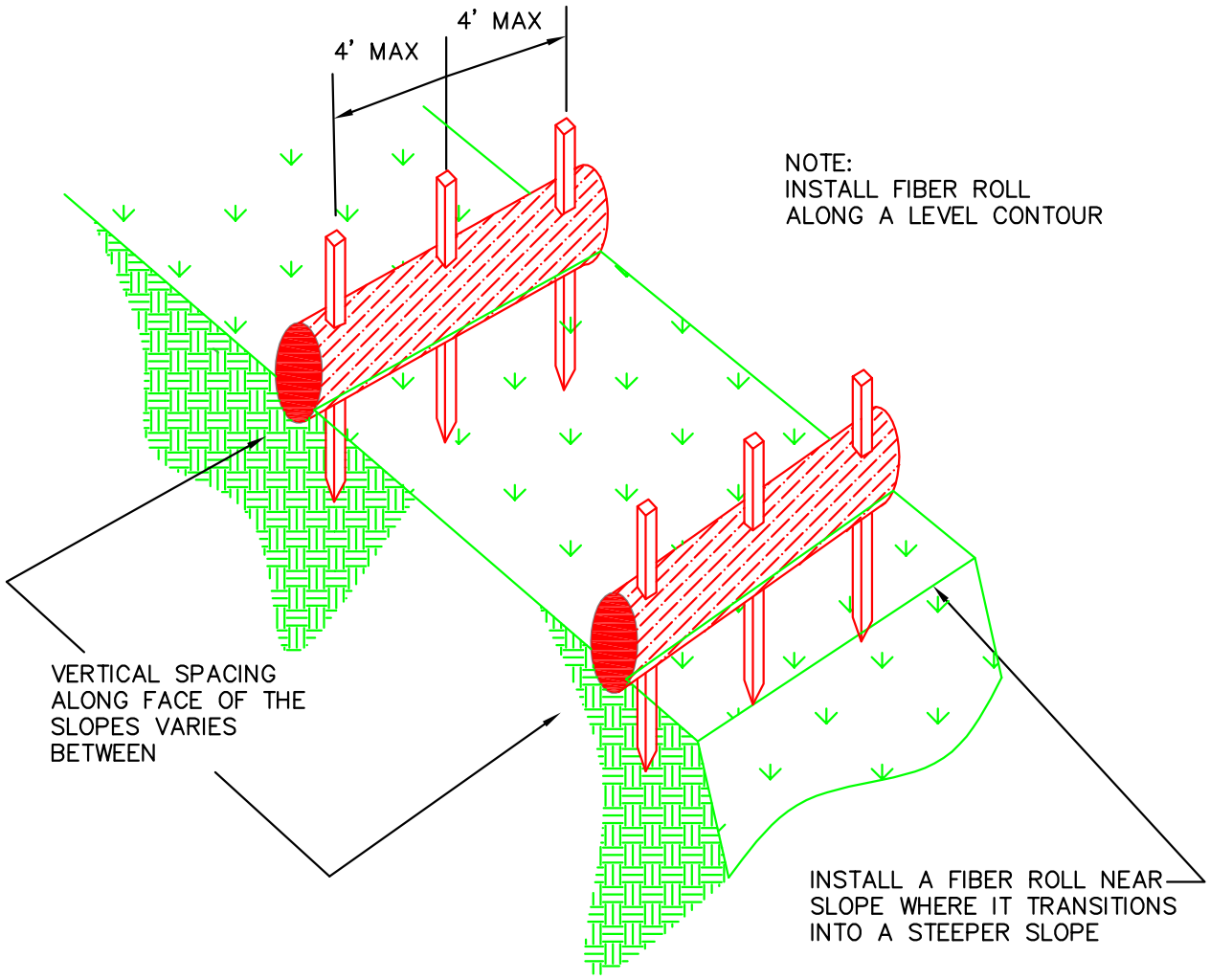
Fiber rolls are typically left in place on slopes. If they are removed after stabilization has been achieved, collect and dispose of the accumulated sediment.

ROBUST ALTERNATIVES

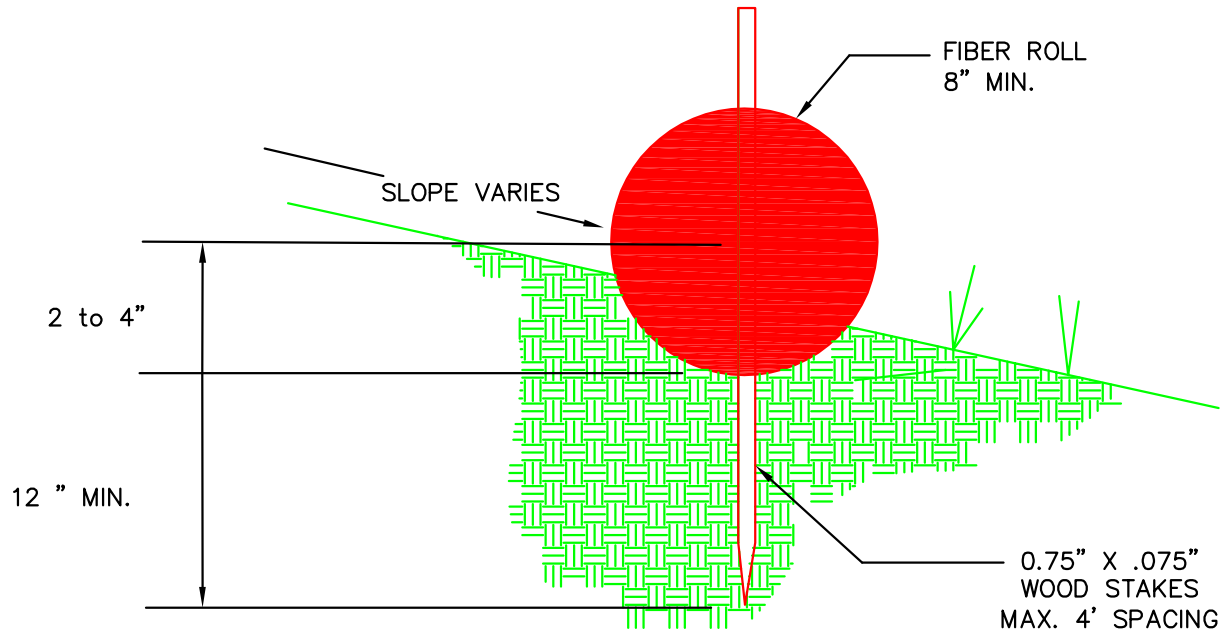
- Compost Sock

COMPANION BMPs

- Erosion Control Blanket



TYPICAL FIBER ROLL INSTALLATION



ENTRENCHING DETAILS

Modified from California Stormwater BMP Handbook

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division	CITY OF Springfield PUBLIC WORKS	CITY OF Springfield ENVIRONMENTAL SERVICES
FIBER ROLLS AND WATTLES		Issued: 10–01–2008 Revised: 06–01–2014	

GRAVEL BAGS

DEFINITION & PURPOSE

Open mesh nylon or burlap bags of gravel designed to pond water and cause sediment to settle out.

APPROPRIATE APPLICATIONS

Gravel bags may be implemented on a project-by-project basis with other BMPs.

CONDITIONS FOR EFFECTIVE USE

Type of Flow: Sheet flow and concentrated flow. Gravel bags can be used alone or with other BMPs. They can be used as inlet protection, check dams in streams and channels, outfall protection, for water diversions, to create temporary sediment basins, and as barriers.

INSTALLATION/CONSTRUCTION PROCEDURES

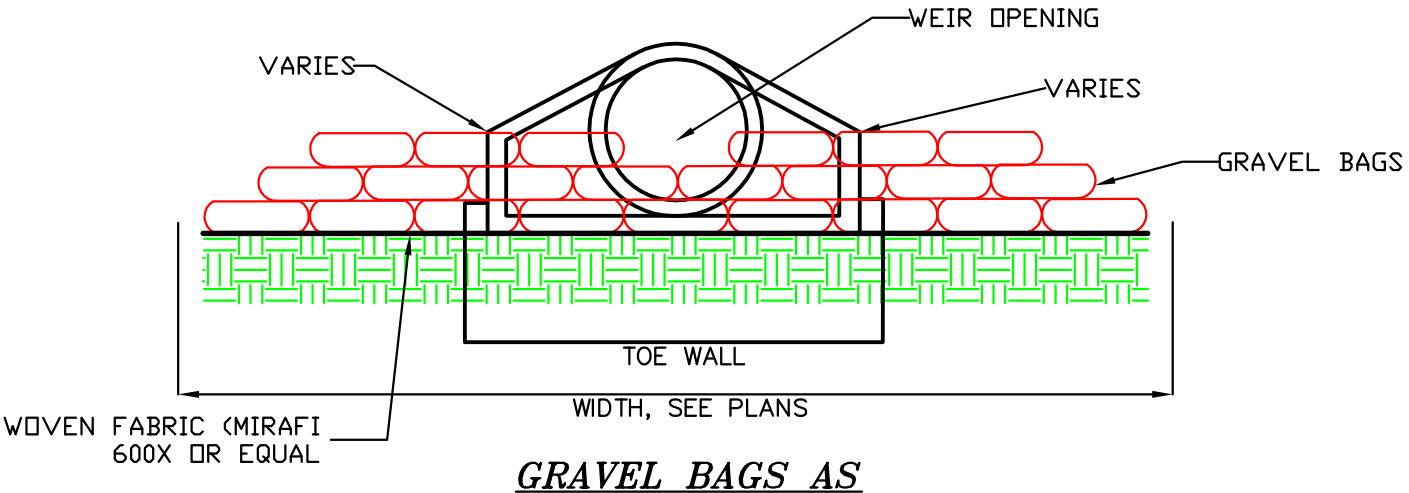
Time of installation is dependent upon the function gravel bags are intended to perform. When used as a linear control for sediment removal, install along a level contour and turn ends of gravel bag row up slope (j-hook style) to prevent flow around the ends. When used for concentrated flows, stack gravel bags to required height using a pyramid approach. The upper rows of gravel bags should overlap joints in lower rows.

OPERATION & MAINTENANCE PROCEDURES

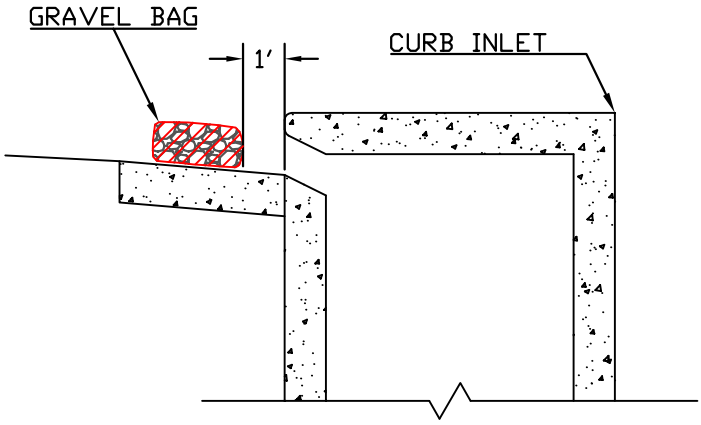
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Replace or stabilize any damaged bags or bags that have moved out of place. Repair wash-outs or other damages as needed. Inspect gravel bags for sediment accumulations, and remove sediment when accumulation reaches ½ the height of the structure.

SITE CONDITIONS FOR REMOVAL

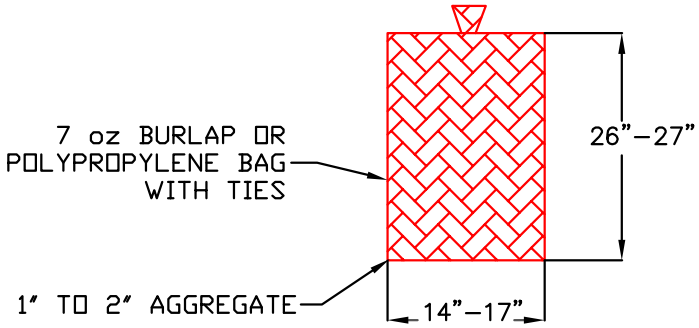
Remove upon completion of upstream/upslope work and vegetation/stabilization of contributing runoff areas.



GRAVEL BAGS AS ROCK OUTLET PROTECTION

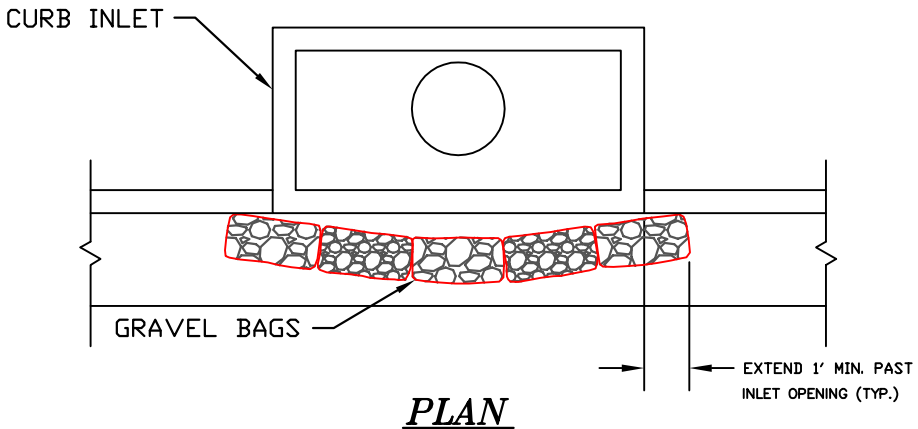


CROSS-SECTION



GRAVEL BAG

NOTE: FILL BAGS 2/3 FULL. 60 LBS MAX WEIGHT



PLAN

NOTE:
1. FILL BAGS WITH CRUSHED 1" TO 2" LIMESTONE
2. BAGS SHALL BE BURLAP OR WOVEN PLASTIC
3. BAGS SHALL BE INSPECTED AND REPLACES AS NEEDED

GRAVEL BAGS AS INLET PROTECTION

NOTE:
COMPOST FILTER SOCK MAY BE USED AS INLET PROTECTION BUT MUST BE STAKED AT EDGES AND IN THE CENTER. USE 8" OR 12" SOCK SIZE DEPENDING ON ROADWAY CLASSIFICATION.

Modified from Chesterfield, Missouri Model BMPs for Land Disturbance

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division	CITY OF Springfield PUBLIC WORKS	CITY OF Springfield ENVIRONMENTAL SERVICES
GRAVEL BAGS		Issued: 04-01-2008 Revised: 06-01-2014	

HOUSEKEEPING

DEFINITION & PURPOSE

Housekeeping refers to construction site management measures that are designed and implemented to minimize discharge of pollutants from the site. Chemicals, hazardous materials, solid waste, human waste and construction debris are some materials stored on site that can be sources of stormwater pollution without proper BMPs and good housekeeping. Follow manufacturer's specifications and refer to material safety data sheets for proper use and disposal of chemicals.

CONDITIONS FOR EFFECTIVE USE

An effective management system requires training and signage to promote proper storage, handling and disposal of materials. Storage areas should be regularly inspected for compliance. Plans should contain notes clearly stating requirements for addressing potential pollutants. Provide sufficient temporary toilet facilities to serve the number of workers on the site. Temporary sanitary facilities should not be placed on top of storm inlets or near waterways. Secondary containment can be added at the base of porta-potties to address leaks/spills. The porta-pottie can be tied down using t-posts to prevent tipping over. Collection of trash and construction debris should be in covered dumpsters. Products should be stored in original containers and tightly sealed. Fueling should be done in areas that do not receive a substantial amount of runoff and do not drain directly to lakes, creeks, streams, rivers, sewers, groundwater, wetlands, or road ditches. Place waste receptacles near area of work and empty them on a regular basis. All fueling activities present on the site shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers. Hazardous wastes shall be managed according to Missouri Hazardous Waste Laws and Regulations. Install appropriate signage. Post guidelines for proper handling, storage and disposal of materials, and emergency spill clean-up on site. See MDNR Guide Section 2 for additional guidance.

INSTALLATION/CONSTRUCTION PROCEDURES

Good housekeeping starts concurrently with work at the site.

OPERATION & MAINTENANCE PROCEDURES

Inspect for good housekeeping in storage areas and throughout the site weekly and within 48 hours of every rain event which causes stormwater runoff to occur on site. Maintenance of temporary toilet facilities should be frequent and thorough. Make necessary corrections and repairs.

SITE CONDITIONS FOR REMOVAL

Housekeeping measures can be removed at the completion of the project.

HYDROSEEDING

DEFINITION & PURPOSE

Hydroseeding is a method of seeding that consists of applying a mixture of water, seed, wood fiber, and soil stabilizer (if used) with hydroseeding equipment.

CONDITIONS FOR EFFECTIVE USE

To select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to: soil conditions, site topography, season and climate, vegetation types, maintenance requirements, sensitive adjacent areas, water availability, and plans for permanent vegetation (if hydroseeding is done for temporary vegetation). Soil should be loose (un-compacted) at time of application. For best results, cover the hydroseed layer with a mulch layer to help protect the seed from wind and erosion, retain soil moisture, and control soil temperature during establishment. Mulching should also be used when there is not sufficient time in the season to ensure adequate vegetation establishment and coverage for erosion control. Conduct a soil test to determine if soil amendments are needed. Fertilizer should only be applied if a soil test indicates it is needed. The hydroseeding mixture should be determined by an industry professional. See MDNR Guide Section 6-87 for additional guidance.

INSTALLATION/CONSTRUCTION PROCEDURES

Hydroseeding should be done immediately after completion of a phase of grading. Hydroseeding can be accomplished using a multiple-step or one-step process. The multiple-step process ensures maximum direct contact of the seeds to soil. When the one-step process is used to apply the mixture of seed, fiber, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil. Follow-up applications shall be made as needed to cover weak spots. Avoid overspray on existing vegetation, waterways, sidewalks, and roadways. Straw or other mulch should be applied to reduce the erosive capacity of stormwater and keep soil and seed in place.

OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Hydroseeded areas should be inspected for failures and re-seeded and mulched within the planting season, using not less than half the original application rates.

ROBUST ALTERNATIVES:

- Sod
- Turf reinforcement mat
- Control Blankets

SEEDING

DEFINITION & PURPOSE

Seeding is used to establish temporary or permanent vegetation in order to protect exposed soil from erosion.

CONDITIONS FOR EFFECTIVE USE

The SWPPP should include a site-specific seeding specification for permanent seeding and for temporary seeding if needed. For public improvements, seeding specifications can be found in Chapter 13, City of Springfield General Conditions and Technical Specifications. See MDNR Guide Section 6-71 Temporary Seeding and Section 6-77 Permanent Seeding for other specifications and guidance. Conduct a soil test to determine the need for soil amendments. Specifications for topsoil and soil amendments should be followed to ensure vegetation establishment and growth. Fertilizer should only be applied if a soil test indicates it is needed. Use additional stabilization (erosion control blankets, etc.) on slopes steeper than 3:1 and in areas of concentrated flow.

INSTALLATION/CONSTRUCTION PROCEDURES

Seeding should be done immediately after completion of a phase of grading, or in areas where construction activity has ceased for 14 days. Follow seeding specification for topsoil, soil amendments, seed type, seeding rate, and seeding dates. Apply straw or other mulch (see Mulching). Water immediately, to a depth of 4 inches.

OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Protect seeded areas from vehicular and foot traffic. Reseed and mulch areas that have not sprouted within 21 days of planting. Repair damaged or eroded areas and reseed/mulch as needed. Do not mow until 4 inches of growth occurs. During the first 4 months, mow no more than 1/3 the grass height. Seeded areas should be repaired and reseeded/mulched for one year following permanent seeding to ensure successful establishment.

ROBUST ALTERNATIVES:

- Sod and Hydroseed

SODDING

DEFINITION & PURPOSE

Sod is a mat of grass with an established root system used to provide immediate vegetation for erosion control.

CONDITIONS FOR EFFECTIVE USE

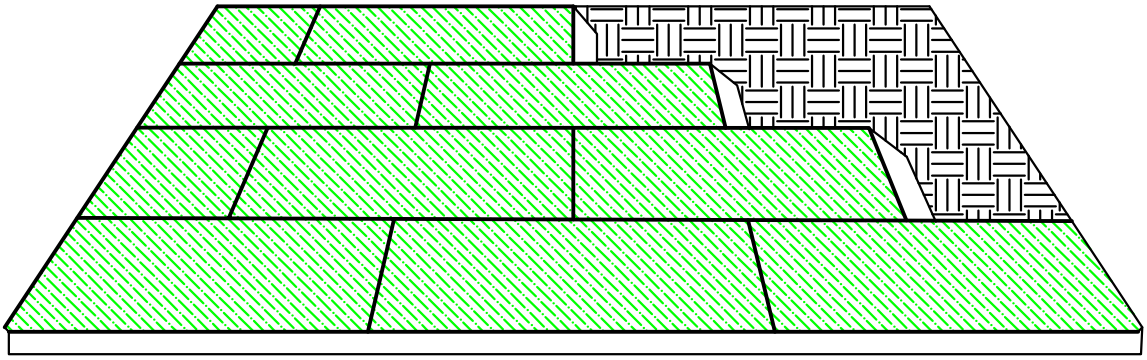
Sod is an effective way to achieve immediate erosion protection in areas of sheet flow and low concentrated flows with velocities less than 5 feet/second. A soil test should be performed to determine if soil amendments are needed. Fertilizer should only be applied if a soil test indicates it is needed.

INSTALLATION/CONSTRUCTION PROCEDURES

Install immediately after finish grading. Remove debris larger than 1 inch in diameter and concentrated areas of smaller debris. Level and roll soil lightly to provide an even grade and firm the surface. Soil should not be excessively wet or dry. Lay first row of sod perpendicular to the slope or direction of flow. Lay subsequent rows tightly against previous rows with joints staggered in a brick-like pattern. Fill minor gaps with good soil and roll entire surface to ensure contact. Stake, staple and/or net corners and centers of sod strips as required, especially in areas of concentrated flow. Water the sod immediately after installation, enough to soak 4 inches into the soil without causing runoff. For additional guidance see MDNR Guide Section 6-107.

OPERATION & MAINTENANCE PROCEDURES

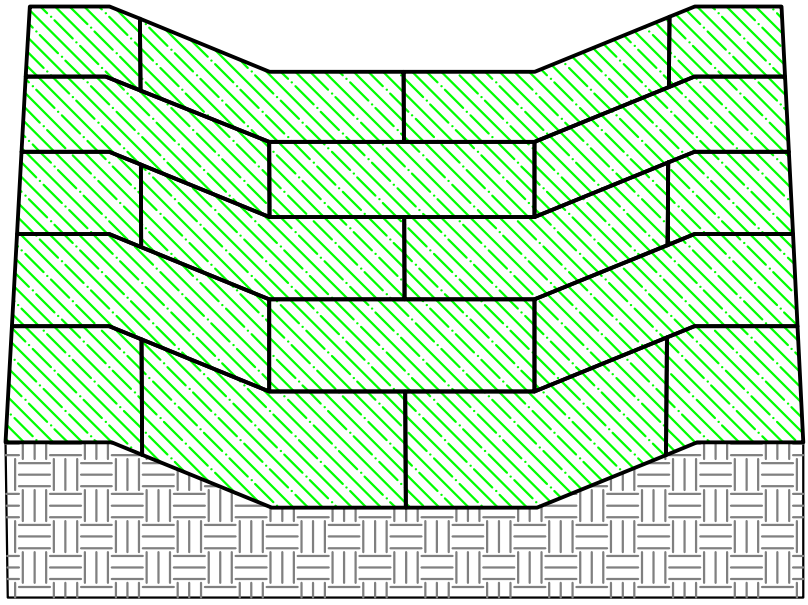
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Water the sod as often as necessary to maintain moist soil to a depth of at least 4 inches. Reposition areas of sod that have moved along the slope. Remove sediment accumulations, and replace sod if necessary. Repair and replace sod in eroded areas as needed. Do not mow sod until 3 inches of new growth occurs. During the first 4 months, mow no more than 1/3 the grass height.



LAY SOD IN A STAGGERED PATTERN WITH STRIPS BUTTED TIGHTLY AGAINST EACH OTHER

ON SLOPE > 3:1 USE PEGS OR STAPLES TO FASTEN SOD FIRMLY AT THE CORNERS AND CENTERS.

INSTALLATION OF GRASS SOD



LAY SOD PERPENDICULAR TO THE DIRECTION OF FLOW. USE PEGS OR STAPLES TO FASTEN SOD FIRMLY AT THE CORNERS AND CENTERS

INSTALLATION OF SOD IN WATERWAYS

Modified from Chesterfield, Missouri Model BMPs for Land Disturbance

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division	CITY OF Springfield PUBLIC WORKS	CITY OF Springfield ENVIRONMENTAL SERVICES
SODDING		Issued: 10–01–2008 Revised: 06–01–2014	

MULCHING

DEFINITION & PURPOSE

A layer of organic material designed to protect exposed soil or freshly seeded areas from erosion by eliminating direct impact of precipitation and slowing overland flows. Mulch materials include grass, hay, straw, wood chips, wood fibers, and shredded bark.

CONDITIONS FOR EFFECTIVE USE

Mulching can be used in areas of sheet flow for temporary soil stabilization on disturbed areas and applied to seeded areas to protect the seed and retain moisture for plant establishment. It is essential to seeding success in most conditions. In landscape areas, mulch is installed for permanent use. Where slopes are 3:1 or greater, hydraulic mulch-bonded fiber matrix, erosion control blankets, or turf reinforcement mats should be used. See MDNR Guide Section 6-91 for additional guidance.

INSTALLATION/CONSTRUCTION PROCEDURES

Install immediately after grading landscaped areas or after seeding in other areas. Grade area and remove all debris larger than 1 inch if area is to be vegetated and mowed in the future, larger than 2 inches if area is to be permanently mulched. If area is to be seeded, follow requirements of seeding. Spread mulch evenly and anchor by crimping it into the ground or using netting.

OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site until adequate vegetation is established. For permanent mulch, inspect annually. Protect from vehicular and foot traffic. Repair damaged or eroded areas, and reseed and replace mulch as needed.

SITE CONDITIONS FOR REMOVAL

Mulching is biodegradable and will remain in place.

POLLUTION PREVENTION PROCEDURES
(GENERAL POLLUTION NOTES)

CITY OF Springfield ENVIRONMENTAL SERVICES

SPILL PREVENTION CONTROLS

Keep a spill kit on-site with equipment necessary for spill clean-up. Equipment and materials include, but are not limited to: brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sawdust, oil-absorbent booms, and trash containers.

FUELING, MAINTENANCE OF EQUIPMENT & VEHICLES

No fueling, servicing, maintenance or repair of equipment or machinery should be done within 100 feet of a stream, or within 150 feet of a classified stream, losing stream, or sinkhole. Tarps or drop cloths and drip pads should be used when servicing, repairing, or performing maintenance on construction equipment in the field. When work is complete, the contaminated materials should be disposed of appropriately.

WASHING OF EQUIPMENT & VEHICLES

No wash water is allowed to discharge into storm drains or drainage way without proper treatment.

PESTICIDES, HERBICIDES, INSECTICIDES, FERTILIZERS & LANDSCAPE MATERIALS

Exposure of these chemicals to precipitation and stormwater on-site should be minimized.

DIESEL FUEL, OIL, HYDRAULIC FLUIDS, OTHER PETROLEUM PRODUCTS & CHEMICALS

All fueling facilities present on the site shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers. All fuel, oil, and other fluids exposed to precipitation shall be stored in watertight, structurally sound, closed containers. Minimize the discharge of fluids from spills and leaks by implementing chemical spill and leak prevention and response procedures, including, but not limited to, installation of containment berms and use of drip pans. Machinery should be kept out of the waterway as much as possible.

HAZARDOUS OR TOXIC WASTE

Hazardous wastes shall be Missouri Hazardous Waste Laws and Regulations. Post guidelines for proper handling, storage and disposal of materials, and emergency spill cleanup on site. An accurate, up-to-date inventory of materials delivered and stored on-site should be kept. Retain original labels and material safety data sheets. All paint, solvents, petroleum products, petroleum waste products and storage containers such as drums, cans, or cartons shall be stored using best management practices. Materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers with proper labels. Store bagged and boxed materials on pallets. Cover bagged and boxed materials during non-working days and prior to rain events. Incompatible materials, such as ammonia and chlorine, must not be stored in the same temporary containment facility. Containers for proper disposal of waste paints, solvents, and cleaning compounds shall be provided. All hazardous wastes that are transported, stored, or used for maintenance, cleaning, or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations. For guidance, contact 1-800-361-4827.

SILT FENCE

DEFINITION & PURPOSE

A silt fence consists of a run of filter fabric, stretched, trenched in the ground and attached to anchored posts. Silt fence used as a perimeter control BMP encourages ponding of runoff and settling of sediment from stormwater.

CONDITIONS FOR EFFECTIVE USE

Install silt fence along slopes, at bases of slopes, and around the perimeter of a site as a final barrier to sediment being carried off site. Silt fence should follow level contour lines with ends turned upslope in a J-Hook. Silt fence should never be used in areas of concentrated flow. Common industry practice is that drainage areas should not exceed 0.25 acres per 100 feet of fence length. See MDNR Guide Section 6-137 for additional guidance.

INSTALLATION/CONSTRUCTION PROCEDURES

Install silt fence prior to disturbance and at intervals during construction of fill slopes. Follow Manufacturer's Specifications. See Typical Detail.

OPERATION & MAINTENANCE PROCEDURES

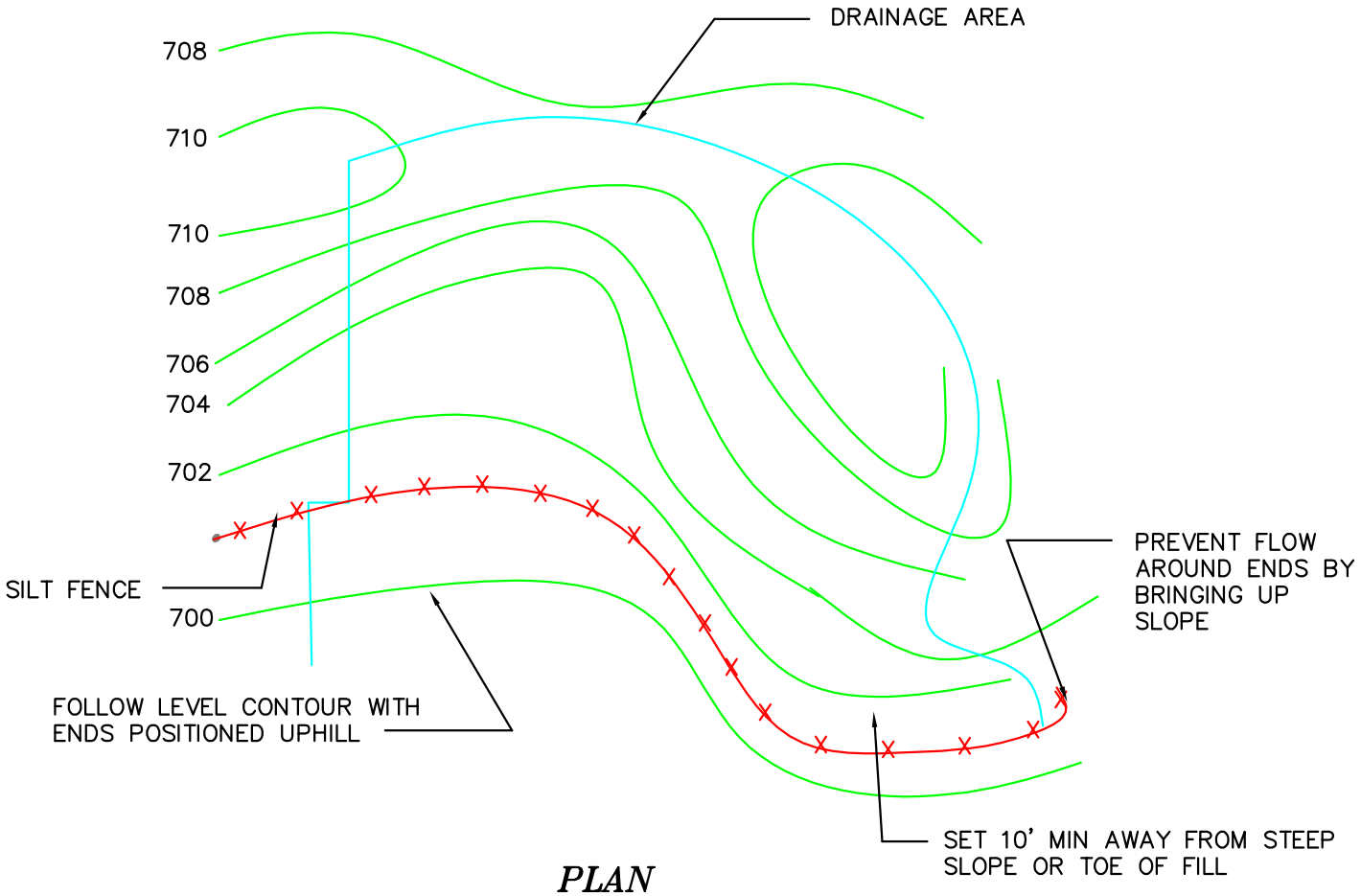
Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site. Remove sediment buildup once it accumulates to 6 inches. Replace torn/clogged fabric, and repair loose fabric and broken stakes.

SITE CONDITIONS FOR REMOVAL

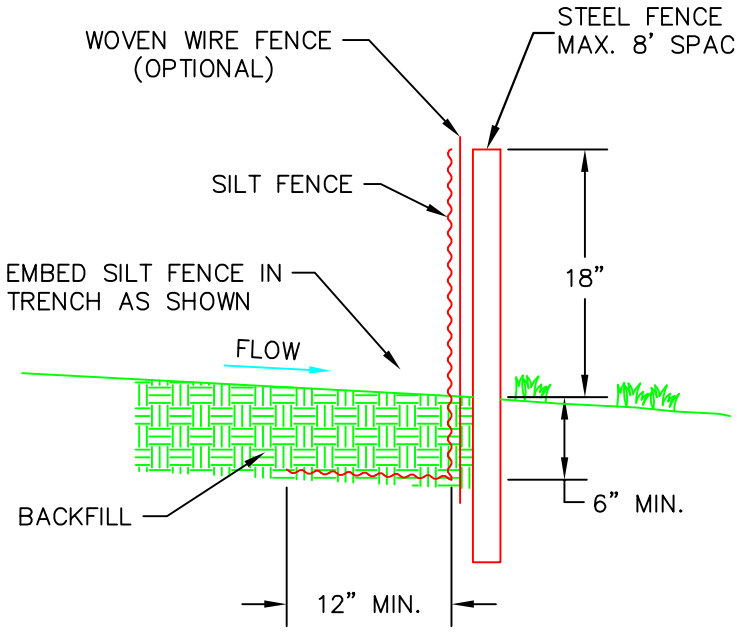
Remove silt fence after permanent vegetation is established. Remove fence, grade trench area and vegetate.

ALTERNATIVES

- Compost Sock



PLAN



NOTES:

1. PLACE SILT FENCE AT DOWNSLOPE LIMIT OF AREA TO BE GRADED.
2. SILT FENCE SHALL BE PLACED ALONG A LEVEL CONTOUR WITH AN ALLOWANCE OF ± 4 INCHES.
3. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
4. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH SUPPORT POST OR TO WOVEN WIRE, WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POSTS.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
6. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
7. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES
8. AT EACH END OF SILT FENCE, TURN FENCE UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES 18 INCHES.

Modified from Chesterfield, Missouri Model BMPs for Land Disturbance

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division		
SILT FENCE		Issued: 10–01–2008 Revised: 06–01–2014	

STOCKPILE PROTECTION

DEFINITION & PURPOSE

Geotextiles or plastic covers may be placed over stockpiles or disturbed soil areas to protect against wind and/or water erosion. Compost filter sock or sediment fence may also be used when necessary to retain stockpiled sediment.

CONDITIONS FOR EFFECTIVE USE

Applications include small graded areas and stockpiles. The use of plastics and impermeable geotextiles may result in 100% runoff, which may cause erosion problems in the areas receiving the increased velocities and flow. Additional BMPs may need to be installed. Covers can be secured in place with wire staples or sandbags. Avoid stockpiling on impervious surfaces, near storm drains, and on steep slopes. Stockpile side slopes should not exceed 2:1. When installing on slopes, key into the top of the slope and along edges to prevent infiltration of surface water under the geotextile. Seams are typically taped or weighted down their entire length. Off-site borrow/fill areas should also be protected by adequate sediment and erosion control BMPs, and if part of a job ≥1 acre, their location should be noted within the SWPPP.

INSTALLATION/CONSTRUCTION PROCEDURES

Installation should occur when stockpile is generated, dependent upon intended use.

OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site, checking for erosion, undermining, and anchorage failure. Any failures shall be repaired immediately. If wash-out or breakages occur, the material shall be re-installed after repairing the damage to the slope.

SITE CONDITIONS FOR REMOVAL

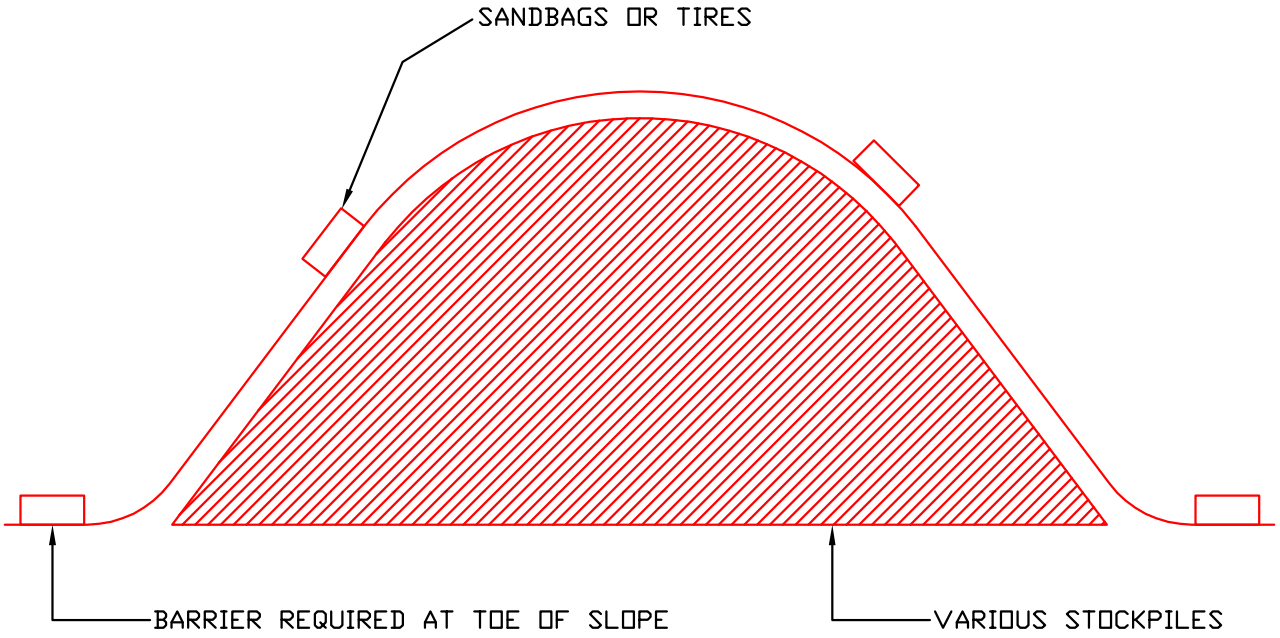
Remove upon establishment of other temporary stabilization BMPs, or after permanent stabilization has occurred.

ROBUST ALTERNATIVES

- Stabilizing stockpile with vegetation.

COMPANION BMPs

- Perimeter control BMP



NOTES:

1. MINIMUM 12" OVERLAP OF ALL SEAMS REQUIRED.
2. BARRIER REQUIRED AT TOE OF SLOPE
3. COVERING MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS OR TIRES ON ROPE WITH A MAXIMUM 10' SPACING IN ALL DIRECTION

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division		
PLASTIC SHEETING		Issued: 10–01–2008 Revised: 06–01–2014	

TURF REINFORCEMENT MAT

DEFINITION & PURPOSE

A turf reinforcement mat (TRM) is a rolled mat of non-degradable synthetic material that provides a matrix to greatly reinforce the root system of the desired vegetation for permanent erosion protection in high flow channels and on critical slopes.

CONDITIONS FOR EFFECTIVE USE

Factors in the selection of TRM include soil conditions, steepness and length of slope, depth of flow, runoff velocities, and time required to establish desired vegetation. Manufacturer's recommendations should be followed in TRM selection. See MDNR Guide Section 6-97 for general guidance on TRM use and selection.

INSTALLATION/CONSTRUCTION PROCEDURES

The type of TRM shown on the plans should be installed immediately after completion of a phase of grading and/or seeding. Follow manufacturer's specifications for installation, particularly noting requirements for check slots, fastening devices (staples), and the need for firm contact with soil. See Manufacturer's Detail or Typical Detail.

OPERATION & MAINTENANCE PROCEDURES

Inspect every week and within 48 hours after every rain event that causes stormwater runoff to occur on-site until adequate vegetation is established. Repair erosion and/or undermining at the top of the slope. Repair undermining beneath mats. Pull back the mats, fill and compact eroded area, seed and then secure mats firmly. Reposition or replace mats that have moved along the slope or channel and secure firmly. Replace damaged mats.

SITE CONDITIONS FOR REMOVAL

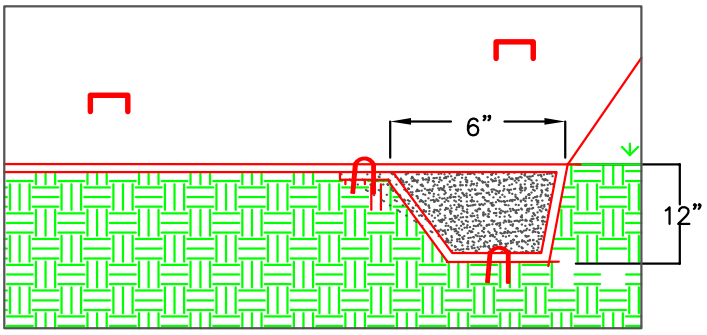
TRMs are left in place permanently.

ROBUST ALTERNATIVES

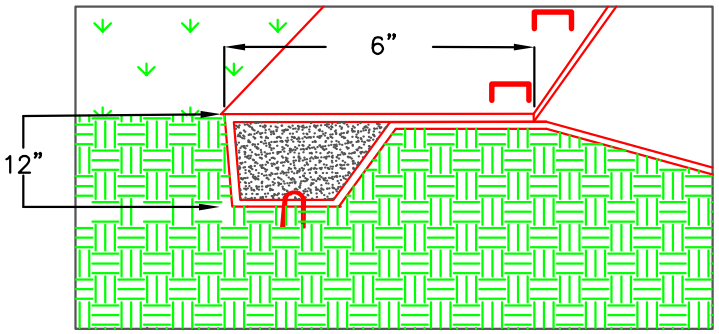
- Plastic transition mat

COMPANION BMPs

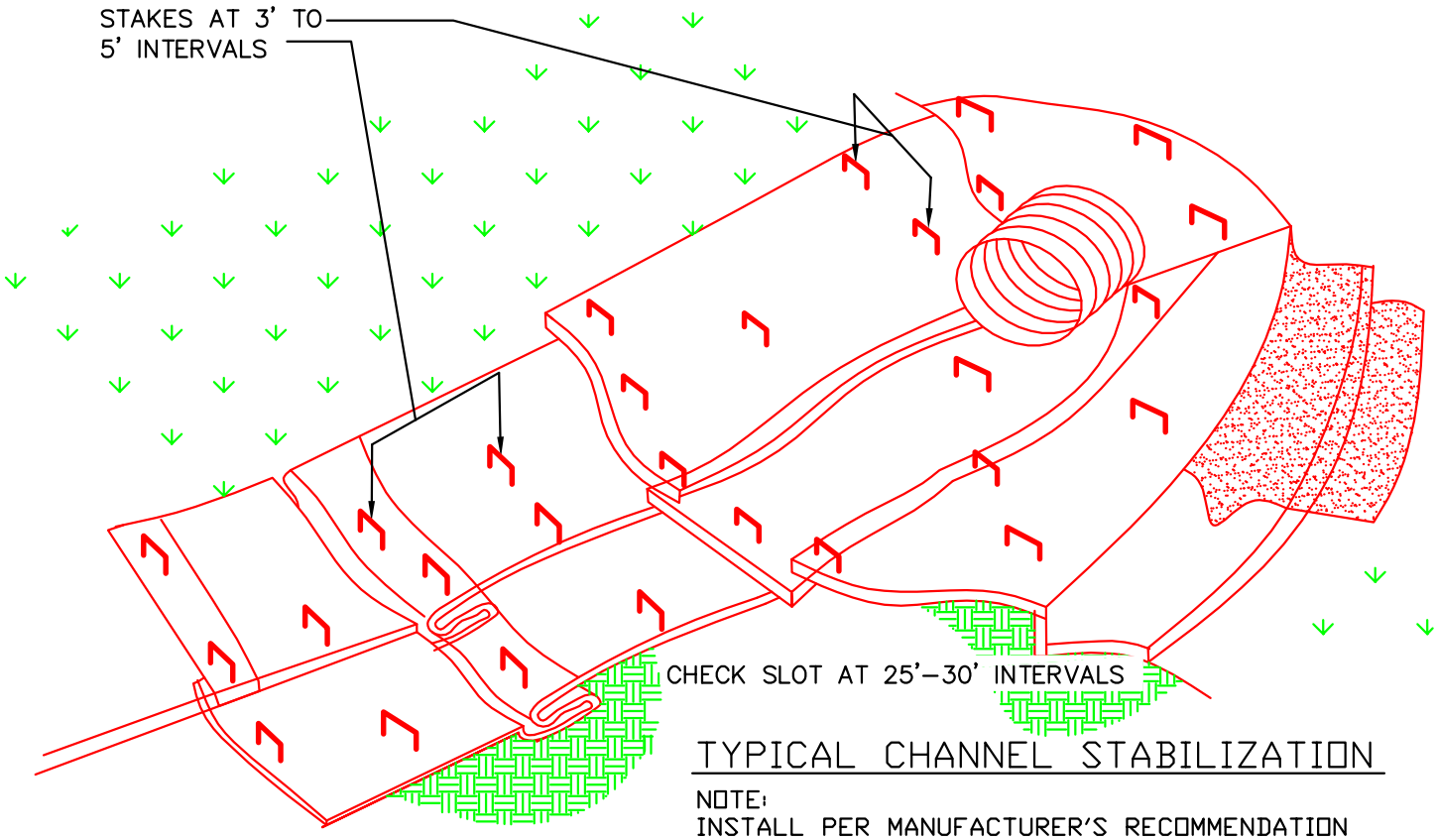
- Ditch Checks in channels and Fiber Rolls on slopes



INITIAL CHANNEL ANCHOR TRENCH

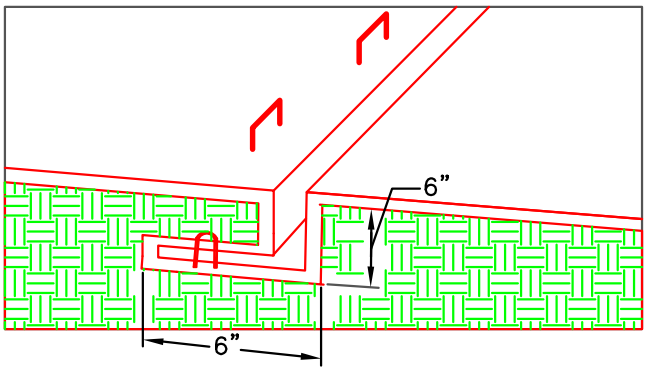


TERMNAL SLOPE AND CHANNEL ANCHOR TRENCH

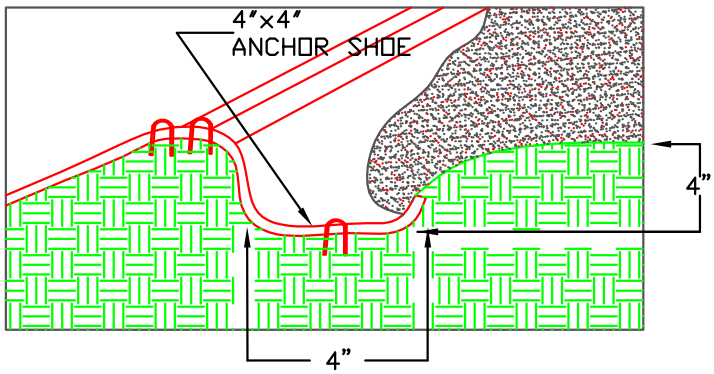


TYPICAL CHANNEL STABILIZATION

NOTE:
INSTALL PER MANUFACTURER'S RECOMMENDATION



INTERMITTENT CHECK SLOT



LONGITUDINAL ANCHOR TRENCH

Modified from California Stormwater BMP Handbook

NTS

City of Springfield, Missouri	Department of Public Works Storm Water Services Division	CITY OF Springfield PUBLIC WORKS	CITY OF Springfield ENVIRONMENTAL SERVICES

TURF REINFORCEMENT MATS

Issued: 10–01–2008

Revised: 06–01–2014

Barry Lawrence Regional Library
MORA18191, Lawrence County
Barry Lawrence Regional Library
213 6th Street
#2417
Monett, MO 65708

Please find your Missouri State Operating Permit which authorizes land disturbance activities for Barry Lawrence Regional Library. This permit has been issued as requested and is based upon application then department.

Please note that prior to the beginning of land disturbance activities other permits may also be required. Especially note the requirements for a Missouri Department of Natural Resources 401 Water Quality Certification and the U.S. Army Corps of Engineers 404 permit. A 401 Certification is needed when placing material, or fill, into the jurisdictional waters of the Unites States. Examples are culverts under road crossings, riprap along stream banks and storm water outfall pipes. The term jurisdictional waters refers to large lakes, rivers, streams and wetlands, including those that don't always contain water.

The permitting and certification process is shared between the department and the U.S. Army Corps of Engineers. More details can be found at the US Army Corps of Engineer's Website at http://www.usace.army.mil/. Some of these activities are also described on page 2, item 3 of the permit.

This permit contains several requirements and should be thoroughly read and understood by you. If your permit requires environmental monitoring, copies of the necessary forms have been . In all future correspondence regarding your permit please reference your permit number as shown on page 1 of the permit.

Please contact the Water Pollution Enforcement and Compliance Unit if you would like to schedule an Environmental Assistance Visit (EAV) at 573-751-1300. During the visit, staff will review the requirements of the permit and answer any questions that you may have. Staff will also be available to walk the site to advise on Best Management Practices required by the permit. The department's regional office staff may also contact you to schedule an EAV.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Sections 644.051.6 and 621.250, RSMo. To appeal, you must file a petition with the administrative hearing commission within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the administrative hearing commission. Contact information for the AHC is as follows: Administrative Hearing Commission, Third Floor, 131 West High Street, Jefferson City, MO 65101 (Mailing address: PO Box 1557, Jefferson City, MO 65102-1557),

Phone: 573-751-2422, Fax: 573-751-5018, Website: www.oa.mo.gov/ahc.

Please be aware that this facility may also be subject to any applicable county or other local ordinances or restrictions.

Sincerely,

Water Protection Program

Chris Wieberg
Director

CW

Barry Lawrence Regional Library
MORA18191

ePermitting Certification and Signature Document

Missouri State Operating General Permit number MORA18191 was issued on 05-26-2021 based on information entered into the Missouri Department of Natural Resources' electronic Permitting (ePermitting) system. Missouri Regulation 10 CSR 20-6.010(2)(B) requires that all applications for construction and operating permits be signed.

Barry Lawrence Regional Library, Lawrence County
2200 Park Street
MONETT, MO 65708 - 6570
Total Permitted Area: 2.59 Acres
Total Number of Permitted Features: 1

Based upon the selection you made on the 'New Permit' screen; it was indicated that a single polygon was drawn indicating the entire disturbance area.

Is any part of the area that is being disturbed in a jurisdictional water of the United States? If yes, you must also receive a Clean Water Act, Section 404 Permit for this site from the United States Army Corp of Engineers.
No

I understand there may be an established Local Authority Erosion Control Plan in the city or the unincorporated area of the county where land disturbance activities covered under this general permit will occur. (Note - you may want to contact your local authority to determine if there are any requirements).
Agreed

A Stormwater Pollution Prevention Plan (SWPPP) must be developed for this site. This plan must be developed in accordance with requirements and guidelines specified within the general permit for storm water discharges from land disturbance activities. The application will be considered incomplete if the SWPPP has not been developed.
Agreed

The above certifications were made electronically in the ePermitting system by:
Name: Joshua Deen Burris
Date: 05/26/2021

I certify that I am familiar with the information contained in the application, that to the best of my knowledge and belief such information is true, complete and accurate, and being granted this permit, I agree to abide by the Missouri Clean Water Law and all rules, regulations, orders and decisions, and terms of this permit, subject to any legitimate appeal available to an applicant under the Missouri Clean Water Commission.
Agreed

Joshua Deen Burris
Signature

05-26-2021
Date

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

General Operating Permit

In compliance with the Missouri Clean Water Law, (chapter 644 R.S. Mo as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.:	MORA18191
Owner Address:	Barry Lawrence Regional Library 213 6th Street #2417 Monett, MO 65708
Continuing Authority:	Barry Lawrence Regional Library 213 6th Street #2417 Monett, MO 65708
Facility Name: Facility Address:	Barry Lawrence Regional Library 2200 Park Street MONETT, MO 65708 - 6570
Legal Description: UTM Coordinates: Receiving Stream: First Classified Stream - ID#: USGS# and Sub Watershed#:	Sec. 29, T 26N, R 27W, Lawrence County 419751.572 / 4087472.550 Tributary to Kelly Creek (U) 100K Extent-Remaining Streams (C) 3960.00 11070207 - 0704

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein.

FACILITY DESCRIPTION

All Outfalls - Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit authorizes only wastewater, including storm water, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System, it does not apply to other regulated areas. This permit may be appealed in accordance with RSMo Section 644.051.6 and 621.250, 10 CSR 20-6.020, and 10 CSR 20-1.020.

Edward B. Galbraith

05-26-2021

Issue date

Edward B. Galbraith, Director, Division of Environmental Quality

Chris Wieberg

02/07/2022

Expiration date

Chris Wieberg, Director, Water Protection Program

APPLICABILITY

1. This general permit authorizes the discharge of stormwater and certain non-stormwater discharges from land disturbance sites that disturb one or more acres or disturb less than one acre when part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project. This general permit also authorizes the discharge of stormwater and certain non-stormwater discharges from smaller projects where the Missouri Department of Natural Resources (Department) has exercised its discretion to require a permit [10 CSR 20-6.200 (1)(B)].

   A Missouri State Operating Permit that specifically identifies the project must be issued before any site vegetation is removed or the site disturbed.

   Any site owner/operator subject to these requirements for stormwater discharges and who disturbs land prior to permit issuance from the Department is in violation of both State and Federal Laws.

   The legal owner of the property or the holder of an easement on the property, and operator on which the site is located are responsible for compliance with this permit.

2. This permit authorizes non-stormwater discharges from the following activities provided that these discharges are addressed in the permittee's specific Stormwater Pollution Prevention Plan (SWPPP) required by this general permit:
   a. De-watering activities if there are no contaminants other than sediment present in the discharge, and the discharge is treated as specified in Requirements, Section C.8.m. of this permit;
   b. Flushing water hydrants and potable water lines;
   c. Water only (i.e., without detergents or additives) rinsing of streets and buildings; and
   d. Site watering to establish vegetation.

3. This general permit does not authorize the placement of fill materials in flood plains, the obstruction of stream flow, directing stormwater across private property not owned or operated by the permittee, or changing the channel of a defined drainage course. This general permit addresses only the quality of the stormwater runoff and the minimization of off-site migration of sediments and other water contaminants.

4. This permit does not authorize land disturbance activity in jurisdictional waters of the United States as defined by the U.S. Army Corps of Engineers, unless the permittee has obtained the required Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers and its associated Section 401 Water Quality Certification from the department. Land disturbance activities may not begin in the affected waters of the United States until the required 404 permit and 401 certification have been obtained.

5. This general permit prohibits any discharge of wastewater generated from air pollution control equipment or the containment of scrubber water in lined ponds to waters of the state.

6. This general permit prohibits any discharge of sewage or pollutants to waters of the state including but not limited to:
   a. Any hazardous material, oil, lubricant, solid waste or other non-naturally occurring substance from the site, including fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;
   b. Soaps or solvents used in vehicle and equipment washing;
   c. Hazardous substances or petroleum products from an on-site spill or handling and disposal practices;

APPLICABILITY (continued)

d. Wash and/or rinse waters from concrete mixing equipment including ready mix concrete trucks, unless managed by an appropriate control. Any such pollutants must be adequately treated and addressed in the SWPPP, and cannot be discharged to waters of the state;
e. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
f. Domestic wastewaters, including gray waters; or
g. Industrial stormwater runoff.

6. The Department reserves the right to revoke or deny coverage under this general permit to applicants for stormwater discharges from land disturbance activities at sites that have contaminated soils that will be disturbed by the land disturbance activity or where such materials are brought to the site to use as fill or borrow. A site-specific permit may be required to cover such activities.

7. Discharges to waters of the state shall not cause violations of the Water Quality Standards 10 CSR 20-7.031, including both specific and general criteria. If at any time the Department determines that the quality of waters of the state may be better protected by requiring the owner/operator of the permitted site to apply for a site-specific permit, the Department may require any person to obtain a site-specific operating permit [10 CSR 20-6.010(13)(C)].

   The Department may require the permittee to apply for and obtain a site-specific or different general permit if:
   a. The permittee is not in compliance with the conditions of this general permit;
   b. The discharge no longer qualifies for this general permit due to changed site conditions and/or regulations; or
   c. Information becomes available that indicates water quality standards have been or may be violated.

   The permittee will be notified in writing of the requirement to apply for a site-specific permit or a different general permit. When a site-specific permit or different general permit is issued to the authorized permittee, the applicability of this general permit to the permittee is automatically terminated upon the effective date of the site specific or different general permit.

8. Any owner/operator authorized by a general permit may request to be excluded from the coverage of the general permit and apply for a site-specific permit [10 CSR 20-6.010(13) (D)].

9. This operating permit does not affect, remove, or replace any requirement of the National Environmental Policy Act, the Endangered Species Act; the National Historic Preservation Act; the Comprehensive Environmental Response, Compensation and Liability Act; or the Resource Conservation and Recovery Act. Determination of applicability to the above mentioned acts is the responsibility of the permittee.

10. This permit does not supersede any requirement for obtaining project approval under an established local authority.

11. This permit is not transferable to other owners or operators.

EXEMPTIONS FROM PERMIT REQUIREMENTS

1. Facilities that discharge all stormwater runoff directly to a combined sewer system are exempt from stormwater permit requirements.

2. Land disturbance activity as described in 10 CSR 20-6.200(1) (B) and 10 CSR 20-6.010(1) (B) where water quality standards are not exceeded.

3. Oil and gas related activities as listed in 40 C.F.R § 122.26(a) (2) (ii) where water quality standards are not exceeded.

REQUIREMENTS

1. This permit is to ensure the design, installation and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed and maintained to:
   a. Control stormwater volume and velocity within the site to minimize soil erosion;
   b. Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion;
   c. Minimize the amount of soil exposed during construction activity;
   d. Minimize the disturbance of steep slopes;
   e. Minimize sediment discharges from the site. Design, install and maintain erosion and sediment controls that address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle size expected to be present on the site;
   f. Provide and maintain natural buffers around surface waters as detailed in 8.f, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and filtering, unless infeasible; and
   g. Minimize soil compaction and, unless infeasible, preserve topsoil.
   h. Capture or treat a 2-year, 24-hour storm event. A 2-year, 24-hour storm event shall be determined for the project location using the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 which can be located at http://hdsc.nws.noaa.gov/hdsc/pfds/.

2. Installation of Best Management Practices (BMP) necessary to prevent soil erosion at the project boundary must be complete prior to the start of all phases of construction.

3. Install sediment controls along any perimeter areas of the site that will receive pollutant discharges.
   a. Remove any sediment per the manufacturer's instructions or before it has accumulated to one-half of the above-ground height of any perimeter control.
   b. For sites where perimeter controls are infeasible, other practices shall be implemented to minimize discharges to perimeter areas of the site.

4. BMPs shall be maintained and remain in effective operating condition during the entire duration of the project, with repairs made within the timeframe specified elsewhere in this permit, until final stabilization has been achieved.

5. Minimize sediment trackout from the site.
   a. Restrict vehicle traffic to properly designed exit points.
   b. Use appropriate stabilization techniques at all points that exit onto paved roads.
   c. Remove any sediment that has been tracked out within the same business day or by the end of the next business day if trackout occurs on a non-business day.

REQUIREMENTS (continued)

6. The primary requirement of this permit is the development and implementation of a SWPPP which incorporates site specific practices to best minimize the soil exposure, soil erosion, and the discharge of pollutants. The permittee shall fully implement the provisions of the SWPPP required under this part as a condition of this general permit throughout the term of the land disturbance project. **The SWPPP must be developed prior to issuance of the permit and must be specific to the land disturbance activities at the site.** A permit must be issued before any disturbance of root zone of the existing vegetation or other land disturbance activities may begin. Either an electronic copy or a paper copy of the SWPPP must be accessible to anyone on-site at all times when land disturbance operations are in progress, or other operational activities that may affect the maintenance or integrity of the BMP structures and made available made available as specified under the Records Section of this permit.

7. The SWPPP must:
   a. List and describe all outfalls;
   b. Incorporate required practices identified below;
   c. Incorporate erosion control practices specific to site conditions;
   d. Provide for maintenance and adherence to the plan;
   e. Discuss whether or not a 404/401 Permit is required for the project; and
   f. Name the person responsible for inspection, operation and maintenance of BMPs.

   The purpose of the SWPPP is to ensure the design, implementation, management and maintenance of BMPs in order to prevent sediment and other pollutants in stormwater discharges associated with the land disturbance activities; compliance with the Missouri Water Quality Standards; and compliance with the terms and conditions of this general permit.

   The permittee shall select, install, use, operate and maintain appropriate BMPs for the permitted site. The following manuals are acceptable resources for the selection of appropriate BMPs. *Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites*, (Document number EPA 833-R-06-004) published by the United States Environmental Protection Agency (USEPA) in May 2007. This manual as well as other information, including examples of construction SWPPPs, is available at the USEPA internet site at https://www3.epa.gov/npdes/pubs/industrial_swppp_guide.pdf; and

   The latest version of *Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri*, published by the Missouri Department of Natural Resources. This manual is available on the Department's internet site at: http://www.dnr.mo.gov/env/wpp/wpcp-guide.htm.

   The permittee is not limited to the use of these guidance manuals. Other guidance publications may be used to select appropriate BMPs. However, all BMPs should be described and justified in the SWPPP.

8. SWPPP Requirements: The following information and practices shall be provided for in the SWPPP:
   a. Nature of the Construction Activity: The SWPPP briefly must describe the nature of the construction activity, including:
      1) The function of the project (e.g., low density residential, shopping mall, highway, etc.);
      2) The intended sequence and timing of activities that disturb the soils at the site;
      3) Estimates of the total area expected to be disturbed by excavation, grading, or other construction activities including off-site borrow and fill areas; and
      4) A general map (e.g., United States Geological Survey quadrangle map, a portion of a city of county map, or other map) with enough detail to identify the location of the construction site and waters of the State within one mile of the site.

REQUIREMENTS (continued)

b. Site Map: The SWPPP must contain a legible site map showing the site boundaries and outfalls and identifying:
   1) Direction(s) of stormwater flow and approximate slopes anticipated after grading activities;
   2) Areas of soil disturbance and areas that will not be disturbed (or a statement that all areas of the site will be disturbed unless otherwise noted);
   3) Location of major structural and non-structural BMPs identified in the SWPPP;
   4) Locations where stabilization practices are expected to occur;
   5) Locations of off-site material, waste, borrow or equipment storage areas;
   6) Locations of all waters of the state (including wetlands);
   7) Locations where stormwater discharges to a surface water; and
   8) Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

c. Site Description: In order to identify the site, the SWPPP shall include facility and outfall information. The SWPPP shall have sufficient information to be of practical use to contractors and site construction workers to guide the installation and maintenance of BMPs.

d. Selection of Temporary and Permanent BMPs: The permittee shall select appropriate BMPs for use at the site and list them in the SWPPP.

e. The SWPPP shall require existing vegetation and trees to be preserved where practical.

f. For surface waters of the state, defined as "all waters within the jurisdiction of this state, including all rivers, streams, lakes and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased or otherwise controlled by a single person or by two or more persons jointly or as tenants in common, located on or adjacent to the site, the permittee must:
   1) Provide and maintain a 50-foot undisturbed natural buffer;
   2) Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or
   3) If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.
   4) Where you are retaining a buffer of any size, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the water:
      i. The ordinary high water mark of the water body, defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or
      ii. The edge of the stream or river bank, bluff, or cliff, whichever is applicable.

g. Description of BMPs: The SWPPP shall include a description of both structural and non-structural BMPs that will be used at the site.

   The SWPPP shall provide the following general information for each BMP which will be used one or more times at the site:
   1) Physical description of the BMP;
   2) Site conditions that must be met for effective use of the BMP;
   3) BMP installation/construction procedures, including typical drawings; and
   4) Operation and maintenance procedures for the BMP.

REQUIREMENTS (continued)

The SWPPP shall provide the following information for each specific instance where a BMP is to be installed:

1) Whether the BMP is temporary or permanent;
2) Where, in relation to other site features, the BMP is to be located;
3) When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
4) Site conditions that must be met before removal of the BMP if the BMP is not a permanent BMP.

h. Disturbed Areas: Slopes for disturbed areas must be defined in the SWPPP. A site map or maps defining the sloped areas for all phases of the project must be included in the SWPPP.

For soil disturbing activities that have been temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days:

1) The permittee shall construct BMPs to establish interim stabilization; and
2) Stabilization must be initiated immediately and completed within 14 calendar days.

For soil disturbing activities that have been permanently ceased on any portion of the site, final stabilization of disturbed areas must be initiated immediately and completed within 14 calendar days.

Allowances to the 14 day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. The use of allowances shall be documented in the SWPPP.

Interim stabilization shall consist of well-established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. These BMPs may include a combination of sediment basins, check dams, sediment fences and mulch. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes. If the slope of the area is greater than 3:1 (three feet horizontal to one foot vertical) or if the slope is greater than 3% and greater than 150 feet in length, then the permittee shall establish interim stabilization within seven days of ceasing operations on that part of the site.

If vegetative stabilization measures are being implemented, stabilization is considered "installed" when all activities necessary to seed or plant the area are completed.

i. Installation: The permittee shall ensure the BMPs are properly installed at the locations and relative times specified in the SWPPP. Peripheral or border BMPs to control runoff from disturbed areas shall be installed or marked for preservation before general site clearing is started. Note that this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit and access of the site, which may require that stormwater controls be installed immediately after the earth disturbance. For phased projects, BMPs shall be properly installed as necessary prior to construction activities. Stormwater discharges from disturbed areas which leave the site shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps and silt fences prior to leaving the land disturbance site. A drainage course change shall be clearly marked on a site map and described in the SWPPP.

j. Sedimentation Basins: The SWPPP shall include a sedimentation basin for each drainage area with ten or more acres disturbed at one time. The sedimentation basin shall be sized to treat a local 2-year, 24-hour storm. Accumulated sediment shall be removed from the basin when basin is 50% full. Utilize outlet structures that withdraw water from the surface when

REQUIREMENTS (continued)

discharging from basins and impoundments unless infeasible. Discharges from the basin shall not cause scouring of the banks or bottom of the receiving stream. The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

Where use of a sediment basin is infeasible, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment delivery. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent water quality protection to achieve compliance with this permit. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

k. Pollution Prevention Measures: The SWPPP shall include BMPs for pollution prevention measures. At minimum such measures must be designed, installed, implemented and maintained to:
   1) Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
   2) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater;
   3) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures. Included but not limited to the installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers; and
   4) Prevent discharges from causing or contributing to an exceedance of water quality standards including general criteria.

l. Roadways: Where applicable, upon installation of or connection to roadways, all efforts should be made to prevent the deposition of earth and sediment onto roadways through the use of proper BMPs. Stormwater inlets susceptible to receiving sediment from the permitted land disturbance site shall have curb inlet protection. Where stormwater will flow off the end of where a roadway terminates, a sediment catching BMP such as gravel berm or silt fence shall be provided. Curb inlets shall be cleaned weekly or following a rainfall that generates a run-off.

m. Dewatering: Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods. An estimation of the volume of water discharged from these dewatering activities shall be kept with the SWPPP after each discharge has ended along with the type and maximum capacity (e.g., flow rate) of equipment used. The SWPPP shall call for specific BMPs designed to treat water pumped from trenches and excavations and in no case shall this water be pumped off-site without being treated by the specified BMPs.

9. Good housekeeping practices shall be maintained at all times to keep waste from entering waters of the state. Solid and hazardous waste management include providing trash containers and regular site cleanup for proper disposal of solid waste such as scrap building material, product/material shipping waste, food containers and cups, and providing containers and proper disposal of waste paints, solvents and cleaning compounds. The provision of portable toilets for proper disposal of sanitary sewage and the storage of construction materials should be kept away from drainage courses and low areas.

REQUIREMENTS (continued)

10. All fueling facilities present shall at all times adhere to applicable federal and state regulations concerning underground storage, above ground storage and dispensers.

11. Hazardous wastes that are transported, stored, or used for maintenance, cleaning, or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations.

12. All paint, solvents, petroleum products, petroleum waste products and storage containers such as drums, cans, or cartons shall be stored according to BMPs. The materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers. All containers shall be inspected for leaks or spillage during the inspection of BMPs.

13. Amending/Updating the SWPPP: The permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. The permittee shall amend the SWPPP at a minimum whenever the:
    a. Design, operation, or maintenance of BMPs is changed;
    b. Design of the construction project is changed that could significantly affect the quality of the stormwater discharges;
    c. Permittee's inspections indicate deficiencies in the SWPPP or any BMP;
    d. Department notifies the permittee in writing of deficiencies in the SWPPP;
    e. SWPPP is determined to be ineffective in minimizing or controlling erosion and sedimentation (e.g., there is visual evidence of excessive site erosion or excessive sediment deposits in streams or lakes); and/or
    f. Department determines violations of water quality standards may occur or have occurred.

14. An individual shall be designated by the permittee as the lead for environmental matters. The lead individual for environmental matters shall have a thorough and demonstrable knowledge of the site's SWPPP and sediment and erosion control practices in general. The lead individual for environmental matters or a designated inspector knowledgeable in erosion, sediment and stormwater control principles shall inspect all structures that function to prevent pollution of waters of the state.

15. Site Inspections Reports: The permittee (or a representative of the permittee) shall conduct regularly scheduled inspections. These inspections shall be conducted by a qualified person, one who is responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. For disturbed areas that have not been finally stabilized, all installed BMPs and other pollution control measures shall be inspected for proper installation, operation and maintenance. All stormwater outfalls shall be inspected for evidence of erosion or sediment deposition. When practicable the receiving stream shall also be inspected for 50 feet downstream of the outfall. Any structural or maintenance problems shall be noted in an inspection report and corrected as soon as possible but no more than seven calendar days after the inspection. All BMPs must be inspected in accordance to one of the two schedules listed below, and any changes to the frequency of inspections, including switching between the options listed below, must be documented in the SWPPP:
    a. At least once every seven calendar days and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased during a normal work day and within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday; or
    b. Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches of precipitation or greater, or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on your site, you must either keep a properly maintained rain gauge on site, or obtain the storm event information from a weather station for your location.
        1) Inspections are only required during the project's normal working hours.

REQUIREMENTS (continued)

2) You must conduct an inspection within 24 hours once a storm event has produced 0.25 inches within a 24 hour period, even if the storm event is still continuing.
3) If you have elected to inspect every 14 calendar days and there is a storm event at your site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, you are required to conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the end of the storm.

The SWPPP must explain how the person responsible for erosion control will be notified when stormwater runoff occurs. If weather conditions prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (including pictures) and there must be a narrative explaining why the work cannot be accomplished within the seven day time period. The documentation must be filed with the regular inspection reports. The permittee shall correct the problem as soon as weather conditions allow. Areas on-site that have been finally stabilized must be inspected at least once per month.

A log of each inspection and copy of the inspection report shall be kept readily accessible and must be available upon request by the Department. Electronic logs are acceptable as long as reports can be provided in a timely manner. If inspection reports are kept off-site, your SWPPP must indicate where they are stored. The inspection report shall be signed by the permittee or by the person performing the inspection if duly authorized to do so. The inspection report is to include the following minimum information:

a. Inspector's name;
b. Date of inspection;
c. Observations relative to the effectiveness of the BMPs;
d. Actions taken or necessary to correct the observed problem; and
e. Listing of areas where land disturbance operations have permanently or temporarily stopped.

16. Notification to All Contractors: The permittee shall be responsible for notifying each contractor or entity (including utility crews and city employees or their agents) who will perform work at the site of the existence of the SWPPP and what action or precautions shall be taken while on-site to minimize the potential for erosion and the potential for damaging any BMP. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.

17. Public Notification: The permittee shall post a copy of the public notification sign described by the Department at the main entrance to the site. The public notification sign must be visible from the public road that provides access to the site's main entrance. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP. The public notification sign must remain posted at the site until the permit has been terminated.

OTHER DISCHARGES

1. Release of a hazardous substance must be reported to the department in accordance with 10 CSR 24-3.010. A record of each reportable spill shall be retained with the Stormwater Pollution Prevention Plan (SWPPP) and made available to the department upon request. The department may also require the submittal of a written or electronic report detailing measures taken to clean up the spill within five (5) days of the spill. Such a report must include the type of material spilled, volume, date of spill, date clean-up was completed, clean-up method, and final disposal method. If the spill occurs outside of normal business hours, or if the permit holder cannot reach regional office staff for any reason, the permit holder is instructed to report the spill to the department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. Leaving a message on a department staff member voice-mail does not satisfy this reporting requirement.

REQUIREMENTS (continued)

2. Removed substances: Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

SAMPLING REQUIREMENTS AND EFFLUENT LIMITATIONS

The Department may require sampling and reporting as a result of illegal discharges, compliance issues, complaint investigations, or other such evidence of contamination from activities at the site. If such an action is needed, the Department will specify in writing any sampling requirements, including such information as location, extent and parameters.

RECORDS

1. The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis and all site inspection records required by this general permit. The records shall be accessible during normal business hours. The records shall be retained for a period of at least three years from the date of the Letter of Termination.

2. The permittee shall provide a copy of the SWPPP to the Department, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties.

3. The permittee shall provide a copy of the SWPPP to those who are responsible for installation, operation, or maintenance of any BMP. The permittee, their representative, and/or the contractor(s) responsible for installation, operation and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.

LAND PURCHASE AND CHANGE OF OWNERSHIP

1. Federal and Missouri stormwater regulations [10 CSR 20-6.200(1) (B)] require a stormwater permit and erosion control measures for all land disturbances of one or more acres. These regulations also require a permit for less than one acre lots if the lot is part of a larger common plan of development or sale where that plan is at least one acre in size.

2. If the permittee sells any portion of the permitted site to a developer for commercial, industrial, or residential use, this land remains a part of the common sale and the new owner must obtain a permit prior to conducting any land disturbance activity. Therefore, the original permittee must amend the SWPPP to show that the property has been sold and therefore no longer under the original permit coverage.

3. Property of any size which is part of a larger common plan of development where the property has been stabilized and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity.

4. If the entire tract is sold to a single entity, then this permit shall be terminated when the new owner obtains a new land disturbance permit for the site.

5. If a portion of a larger common plan of development is sold to an individual for the purpose of building his or her own private residence, a permit is required if the portion of land sold is equal to or greater than one acre while no permit is required for less than one acre of land sold.

TERMINATION

1. This permit may be terminated when the project is stabilized. The project is considered to be stabilized when perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetation cover shall be at least 70% over 100% of the site. In order to terminate the permit, the permittee shall notify the Department by submitting Form H Request for Termination of a General Permit.

2. The Cover Page (Certificate Page) of the Master General Permit for Land Disturbance specifies the "effective date" and the "expiration date" of the Master General Permit. The "issued date" along with the "expiration date" will appear on the State Operating Permit issued to the applicant. This permit does not continue administratively beyond the expiration date.

3. Due to the nature of the electronic permitting system, a period of 60 days will be granted at the discretion of the department in order to apply for a new permit after the new version is effective. Applicants must maintain appropriate best management practices during the discretionary period.

DUTY TO REAPPLY

If the project or development completion date will be after the expiration date of this general permit, then the permittee must reapply to the Department for a new permit. This permit may be applied for and issued electronically once made available by the director in accordance with Section 644.051.10, RSMo.

MODIFICATION, REVOCATION, AND REOPENING

1. If at any time the Department determines that the quality of waters of the state may be better protected by reopening this permit, or revoking this permit and requiring the owner/operator of the permitted site to apply for a site-specific permit, the Department may revoke a general permit and require any person to obtain such an operating permit as authorized by 10 CSR 20-6.010(13) and 10 CSR 20-6.200(1) (B).

2. If this permit is reopened, modified or revoked pursuant to this Section, the permittee retains all rights under Chapter 536 and 644 Revised Statutes of Missouri upon the Department's reissuance of the permit as well as all other forms of administrative, judicial, and equitable relief available under law.

STANDARD CONDITIONS

These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

1. Other Information
   a. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

2. Duty to Comply
   a. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

STANDARD CONDITIONS (continued)

3. Duty to Provide Information
   a. The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

4. Inspection and Entry
   a. The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
      i. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
      ii. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
      iii. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
      iv. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

5. Signatory Requirement
   a. All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
   b. The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
   c. The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

Missouri Department of Natural Resources
Fact Sheet
MO-RA00000

The Federal Water Pollution Control Act [Clean Water Act (CWA)] Section 402 of Public Law 92-500 (as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the CWA). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (permit) are issued by the Missouri Department of Natural Resources (department) under an approved program, operated in accordance with federal and state laws (Federal CWA and Missouri Clean Water Law Section 644 as amended). Permits are issued for a period of five (5) years unless otherwise specified.

Per 40 CFR 124.56, 40 CFR124.8, and 10 CSR 20-6.020(1)(A)2., a Fact Sheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the permit. A Fact Sheet is not an enforceable part of an MSOP.

This Fact Sheet is for a:

- ☐ Major
- ☐ Minor
- ☐ Industrial Facility
- ☐ Variance
- ☒ Master General Permit
- ☐ Permit with widespread public interest

Definitions

Common Promotional Plan: A plan undertaken by one (1) or more persons, to offer lots for sale or lease; where land is offered for sale by a person or group of persons acting in concert, and the land is contiguous or is known, designated or advertised as a common unit or by a common name or similar names, the land is presumed, without regard to the number of lots covered by each individual offering, as being offered for sale or lease as part of a common promotional plan.

Immediately: For the purposes of this permit, immediately should be defined as within 24 hours.

Infeasible: Infeasible means not technologically possible, or not economically practicable and achievable in light of best industry practices.

Larger Common Plan of Development or sale: A contiguous area where multiple separate and distinct construction activities are occurring under one plan.

Ordinary High Water Mark: The line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation and/or the presence of litter and debris.

Peripheral: For the purposes of this permit, peripheral should be defined as the outermost boundary of the area that will be disturbed.

Permanently: For the purposes of this permit, permanently should be defined as any activity that has been ceased without any intentions of future disturbance.

Waters of the state: Section 644.016.1(27) RSMo. defines waters of the state as, "All waters within the jurisdiction of this state, including all rivers, streams, lakes and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased or otherwise controlled by a single person or by two or more persons jointly or as tenants in common."

Part I – Facility Information

Facility Type: Industrial Stormwater
Facility Description: Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling, and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit establishes a SWPPP requirement to minimize pollutants of concern from this type of facility or for all facilities covered under this permit. 10 CSR 20-6.200(6)(A)7. specifies that "general permits shall contain BMP requirements and/or monitoring and reporting requirements to keep the stormwater from becoming contaminated." Local conditions are not considered when developing conditions for a general permit. A facility may apply for a site-specific permit if they desire a review of site-specific conditions.

While drafting this permit for renewal, the department hosted four public meetings held on January 27, February 24, April 18, and May 19, 2016, which allowed stakeholders to voice concerns about conditions within the permit and submit comments during the period of initial stakeholder involvement. These concerns were taken into consideration when drafting the permit. In addition to these meetings, the department also held an informal review period for stakeholders to review the draft prior to the 30 day public comment period.

Part II – Receiving Stream Information

APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:
Per Missouri Effluent Regulations (10 CSR 20-7.015), the waters of the state are divided into seven (7) categories. This permit applies to facilities discharging to the following water body categories:

Please mark all appropriate designated waters of the state categories of the receiving stream.

- ☒ Missouri or Mississippi River [10 CSR 20-7.015(2)]
- ☒ Lakes or Reservoirs [10 CSR 20-7.015(3)]
- ☒ Losing Streams [10 CSR 20-7.015(4)]
- ☒ Metropolitan No-Discharge Streams [10 CSR 20-7.015(5)]
- ☒ Special Streams [10 CSR 20-7.015(6)]
- ☐ Subsurface Waters [10 CSR 20-7.015(7)]
- ☒ All Other Waters [10 CSR 20-7.015(8)]

Missouri Water Quality Standards (10 CSR 20-7.031) defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1st classified receiving stream's beneficial water uses shall be maintained in accordance with 10 CSR 20-7.031(4). The BMP requirement established by this permit are intended to be protective of all streams that fall within the categories of receiving water bodies indicated above. A general permit does not take into consideration site-specific conditions.

Part III – Applicability

Condition number 8 was expanded to include a more comprehensive list of state and federal requirements that must be taken into consideration.

If the proposed project encounters and will potentially affect a species of concern, please report it to the Missouri Department of Conservation and the United States Fish and Wildlife Service. For more information about requirements of the Endangered Species Act, please visit the following links:

1. To determine the potential for species of concern within or near a project, please visit the United States Fish and Wildlife Services' "Information, Planning and Conservation" website at http://ecos.fws.gov/ipac/.
2. If there are listed species in the county or township, check to see if critical habitat has been designated and if that area overlaps or is near the project area. Critical habitat designations and associated requirements may also be found at 50 CFR Parts 17 and 226. For additional information, use the map view tool at http://criticalhabitat.fws.gov/crithab/ to find data specific to your state and county.

The Missouri Department of Conservation's internet site for the Natural Heritage Review may be very helpful and can be found at the following link, http://mdcgis.mdc.mo.gov/heritage/newheritage/heritage.htm.

Part IV – Exemptions

Condition Number 2 was added to cite all state exemptions from permitting requirements, combining several previous cited exemptions into one condition and reference. This includes an exemption for linear construction where the entire disturbance, including clearing of land to access the linear disturbance, is less than two feet in width.

Condition Number 3 was added to cite federal regulations that exclude land disturbance projects as related to the installation or maintenance work for oil and gas related activities.

Part V – Rationale of Technology Based Limitations & Permit Conditions

303(d) LIST & TOTAL MAXIMUM DAILY LOAD (TMDL):
Section 303(d) of the Federal CWA requires that each state identify waters that are not meeting Water Quality Standards and for which adequate water pollution controls have not been required. Water Quality Standards protect such beneficial uses of water as whole body contact, maintaining fish and other aquatic life, and providing drinking water for people, livestock, and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs.

ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA Section 303(d) (4); CWA Section 402(c); 40 CFR Part 122.44(I)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

☒ Applicable: Backsliding proposed in this permit conforms to the anti-backsliding provisions of Section 402(o) of the CWA and 40 CFR 122.44. The department has determined that technical mistakes were made in the previous permit [CWA 402(o)(2)(B)(ii)]. The Settleable Solids limitation was removed since has been determined to not be adequate in protecting water quality in all areas of the state. Increased technology based best management practices will protect water quality at a similar if not more protective level.

ANTIDEGRADATION:
Antidegradation policies ensure protection of water quality for a particular water body on a pollutant by pollutant basis to ensure Water Quality Standards are maintained to support beneficial uses such as fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as an Outstanding National Resource Water or Outstanding State Resource Water [10 CSR 20-7.031(3) (C)]. Antidegradation policies are adopted to minimize adverse effects on water. The department has determined that the best avenue forward for implementing the Antidegradation requirements into general permits is by requiring the appropriate development and maintenance of a SWPPP. The SWPPP must identify all Best Management Practices (BMPs) that are reasonable and effective, taking into account environmental impacts and costs. This analysis must document why no discharge or no exposure options are not feasible at the facility. This selection and documentation of appropriate control measures will then serve as the analysis of alternatives and fulfill the requirements of the Antidegradation Rule and Implementation Procedure 10 CSR 20-7.031(3) and 10 CSR 20-7.015(9)(A)5.

Any facility seeking coverage under this permit, which undergoes expansion or discharges a new pollutant of concern, must update their SWPPP and select new BMPs that are reasonable and cost effective. New facilities seeking coverage under this permit are required to develop a SWPPP that includes this analysis and documentation of appropriate BMPs. Renewal of coverage for a facility requires a review of the SWPPP to assure that the selected BMPs continue to be appropriate.

☒ Applicable: The main pollutant of concern in this permit is sediment. Compliance with the technology based limitations established in this permit for the protection of General Criteria, along with the evaluation and implementation of BMPs as documented in the SWPPP, meets the requirements of Missouri's Antidegradation Review [10 CSR 20-7.031(3), 10 CSR 20-7.031 Table A, and 10 CSR 20-7.015(9)(A)5].

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(3)(k) Best Management Practices (BMPs), BMPs are implemented to control or abate the discharge of pollutants when: (1) Authorized under Section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities: (2) Authorized under Section 402(p) of the CWA for the control of stormwater discharges; (3) Numeric effluent limitations are infeasible; or (4) The practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA.

In accordance with Developing Your Stormwater Pollution Prevention Plan, a Guide for Construction Sites (EPA 833-R-06-004; https://www3.epa.gov/npdes/pubs/sw_swppp_guide.pdf) published by the United States Environmental Protection Agency (EPA) in May 2007, BMPs are measures or practices used to reduce the amount of pollution entering waters of the state. BMPs may take the form of a process, activity, or physical structure. EPA developed resources and tools related to construction stormwater along with the BMPs to control and minimize stormwater (https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources). Along with EPA's resources and tools, the International Stormwater BMP database (www.bmpdatabase.org/index.htm) may provide guidance on BMPs appropriate for specific industries.

Additionally in accordance with Stormwater Management, a SWPPP is a series of steps and activities to (1) identify sources of pollution or contamination, and (2) select and carry out actions which prevent or control the pollution of stormwater discharges.

☒ Applicable: A SWPPP shall be developed and implemented for each site and shall incorporate required practices identified by the department with jurisdiction, incorporate erosion control practices specific to site conditions, and provide for maintenance and adherence to the plan.

The new permit has been revised to allow permittees to store SWPPP documents electronically as long as they can be provided in an expedient manner.

WATER QUALITY STANDARDS:
Per 10 CSR 20-7.031(4), General Criteria shall be applicable to all waters of the state at all times, including mixing zones. Additionally, 40 CFR 122.44(d)(1) directs the department to include in each NPDES permit conditions to achieve water quality established under Section 303 of the CWA, including state narrative criteria for water quality.

General Criteria. The following water quality criteria shall be applicable to all waters of the state at all times. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:

(1) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits, or prevent full maintenance of beneficial uses;
(2) Waters shall be free from oil, scum, and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
(3) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor, or prevent full maintenance of beneficial uses;
(4) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal, or aquatic life;
(5) There shall be no significant human health hazard from incidental contact with the water;
(6) There shall be no acute toxicity to livestock or wildlife watering;
(7) Waters shall be free from physical, chemical, or hydrologic changes that would impair the natural biological community;
(8) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment, and solid waste as defined in Missouri Solid Waste Law, Section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to Section 260.200-260.247, RSMo.

The settelable solids requirement was removed from this permit and was replaced with additional, more specific, BMP requirements. The settelable solids limit was determined not to be protective of all waters across the state, therefore, it was removed.

Additional BMPs added to the permit will provide for more consistency across the state. Examples of these BMPs include requirements to:

- Install and maintain perimeter controls along areas of the site that will receive pollutant discharges;
- Minimize sediment trackout from the site;
- Capture or treat runoff up to and including a 2-year, 24-hour storm event; and
- Direct stormwater to vegetated areas.

The minimum buffer width was increased from 25 feet to 50 feet. Studies have shown that a 50 foot vegetative buffer more adequately treats sediment from stormwater discharges. This appears to be standard in EPA's permit as well as in many other states.

In order to design controls that match the sediment removal efficiency of a 50- foot buffer, first you must know what this efficiency is for your site. The sediment removal efficiencies of natural buffers vary according to a number of site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of sediment controls used to reduce the discharge of sediment prior to the buffer.

Sediment removal efficiencies are based on the U.S. Department of Agriculture's RUSLE2 (Revised Universal Soil Loss Equation 2) model for slope profiles using a 100-foot long exposed slopes.

Sediment removal is defined as the annual sediment delivered at the downstream end of the 50-foot natural buffer (tons/yr/acre) divided by the annual yield from cleared area (tons/yr/acre).

Sediment removal is in part a function of (1) a perimeter control (i.e., silt fence) located between the disturbed portion of the site and the upland edge of the natural buffer and (2) stormwater flows traveling through a 50-foot buffer of undisturbed natural vegetation.

Additional guidance may be found at https://www.epa.gov/sites/production/files/2015-10/documents/cgp2012_appendixg.pdf.

Inspection frequencies: Site inspection frequencies have been changed from the previous permit based upon guidance from the US EPA and from stakeholder discussions. These frequencies will allow flexibility but will still allow for frequent enough inspections to ensure that all BMPs are adequately functioning.

Part VI – Effluent Limitations Determination

In this general permit, Technology-Based Effluent Limitations are established through the SWPPP and BMP requirements. Effective BMPs may have to be designed on a site-specific basis. The concurrent implementation of monitoring and benchmarks provides a tool for each facility to evaluate the effectiveness of BMPs to ensure protection of water quality.

Part VII – Land Purchase and Change of Ownership

A **"larger common plan of development or sale"** is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan. This term is used in conjunction with common promotional plan, as defined in §644, RSMo.

Any portion of a project that is sold to a developer is still considered part of a larger common plan of development or sale and will require a permit.

If a portion of a site is sold to an individual for the purpose of building his or her private residence:

- A permit is required if the portion of land sold is equal to or greater than one acre.
- A permit is not required if the portion of land sold is less than one acre.

Part VIII – Termination

The word 'plant density' was removed from the first paragraph since the department determined that percent of vegetative cover more accurately describes the vegetative requirements of this permit. This decision was made after discussion within the department and with stakeholders.

It is preferable that temporary BMPs such as sediment fence be removed prior to permit termination to eliminate potential solid waste issues that may occur as a result of unnecessary and unmaintained BMPs.

Part IX – Duty to Reapply

This section has been revised to reflect the current applicable statutes which require applicants to submit an application for coverage electronically as soon as they are made available by the director. The determination was made that facilities do not need to submit an application 30 days prior to expiration because this permit does not administratively continue. Additionally, due to limitations within the electronic system currently used to issue permits, the department will use its discretion to allow existing permit holders a period of 60 days to reapply after the new version of the permit is effective. The department will announce the availability status of the new permit and the process to reapply at least 30 days prior to the expiration of the existing permit.

Part X – Standard Conditions

This section was revised to only include the specific standard conditions that apply to this permit. All other conditions have been removed.

Part XI – Administrative Requirements

On the basis of preliminary staff review and applicable standards and regulations, the department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the permit. The proposed determinations are tentative pending public comment.

PUBLIC NOTICE:
The department shall give public notice that a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest or because of water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and facility must be notified of the denial in writing.

The department must give public notice of a pending permit or of a new or reissued Missouri State Operating Permit. The public comment period is a length of time not less than thirty (30) days following the date of the public notice, during which interested persons may submit written comments about the proposed permit.

For persons wanting to submit comments regarding this proposed permit, please refer to the Public Notice page located at the front of this draft permit. The Public Notice page gives direction on how and where to submit appropriate comments.

☒ The Public Notice period seeking comments on this permit occurred from September 2, 2016 to October 3, 2016.

DATE OF FACT SHEET: 8/23/2016; REVISED 11/30/2016

COMPLETED BY:
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MoDNR Geographic Information System Editor

Legend

- Land Disturbance Point
- Land Disturbance Area
- 12 Digit Watershed Boundaries
- Impaired Streams - 303(d)
- Impaired Lakes - 303(d)
- Stream Classifications and Use Designations
- Lake Classifications and Use Designations
- Public Land Survey System
- Interstates and U.S. highways
- State numbered routes
- State letttered routes
- ramps
- Major roads
- Minor roads
- Railroads
- County Boundaries
- Lake or Pond
- Lake or Pond / Intermittent
- Lake or Pond / Perennial
- Reservoir
- Swamp or Marsh
- Other; Artificial Path
- Canal or Ditch
- Stream or River
- Stream or River / Intermittent
- Stream or River / Perennial
- Municipalities Boundary
- Municipalities Fill

N

Printed: May 26, 2021

Missouri Department of Natural Resources

STORMWATER DISCHARGES FROM THIS LAND DISTURBANCE SITE ARE AUTHORIZED BY THE MISSOURI STATE OPERATING PERMIT NUMBER:

ANYONE WITH QUESTIONS OR CONCERNS ABOUT STORMWATER DISCHARGES FROM THIS SITE, PLEASE CONTACT THE MISSOURI DEPARTMENT OF NATURAL RESOURCES AT

1-800-361-4827

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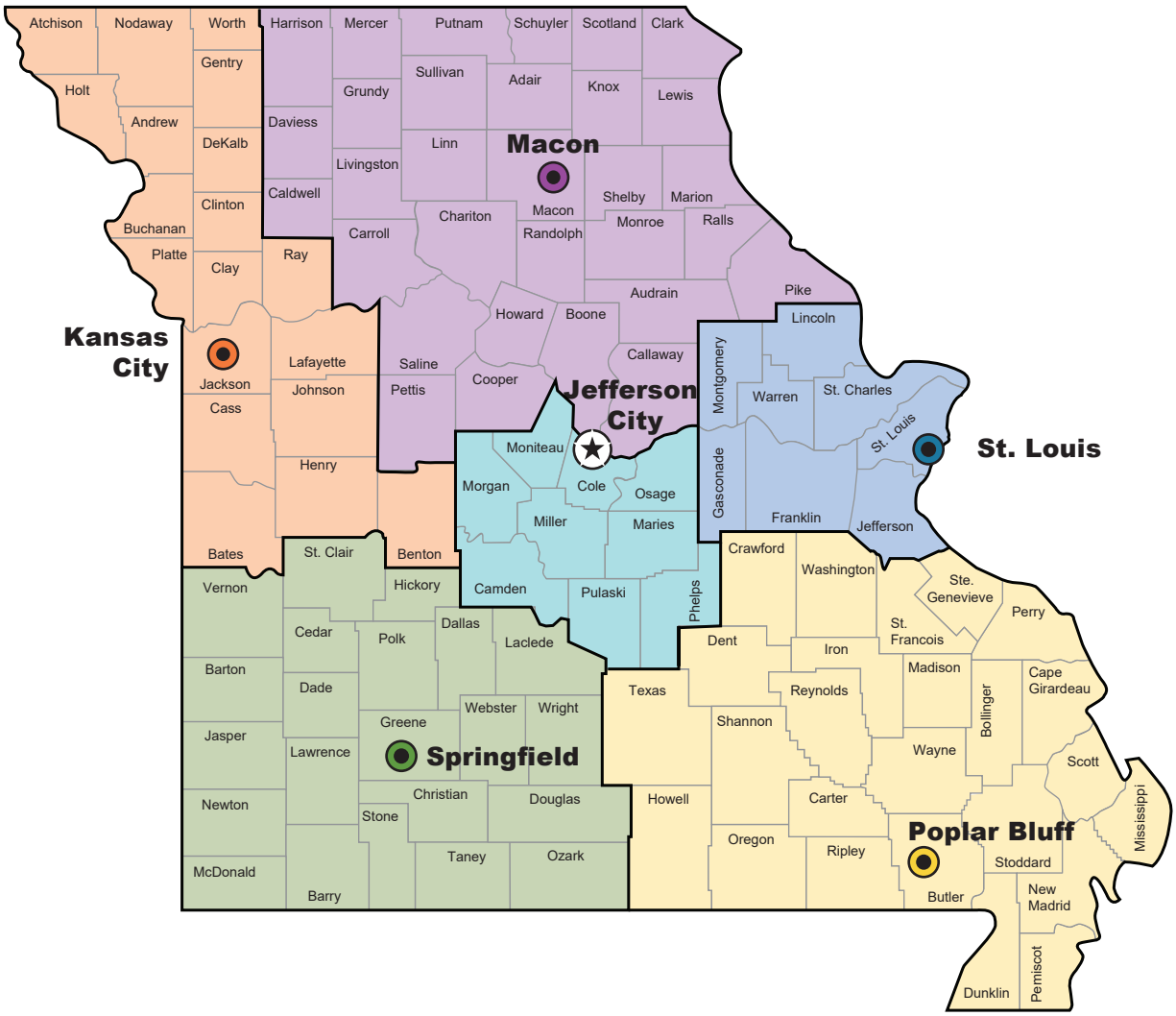

6/25/19

For more information on the departmen
visit dnr.mo.gov or call 800-361-4827