January 2024

INVITATION TO BID
PUBLIC WORKS
PROJECT NUMBER
SW-C1124

PROJECT MANUAL

FOR

WELCOME CENTER AND ENTRANCE IMPROVEMENTS

AT

CAPE DISAPPOINTMENT STATE PARK

IN

PACIFIC COUNTY

BID DEADLINE: 1:00 P.M., THURSDAY, AUGUST 21, 2025
Bidders are required to submit bid prices electronically through the State Parks Public Opportunities-MRSC Bonfire Procurement Portal
https://mrscrosters.bonfirehub.com

****BIDS WILL BE OPENED WITHIN THREE BUSINESS DAYS****

WASHINGTON STATE PARKS & RECREATION COMMISSION
300 DESMOND DRIVE SE
LACEY, WA 98503
POST OFFICE BOX 42650
OLYMPIA, WASHINGTON 98504-2650

PROJECT MANUAL

FOR

WELCOME CENTER AND ENTRANCE IMPROVEMENTS

AT

CAPE DISAPPOINMENT STATE PARK

IN

PACIFIC COUNTY

Approved for Construction _____
Heather Saunders, Director of Parks Development

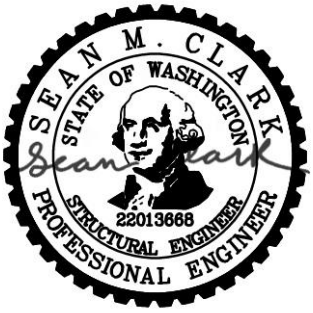
WASHINGTON STATE PARKS AND RECREATION COMMISSION
1111 ISRAEL ROAD SW
TUMWATER, WASHINGTON 98501-6512
P.O. BOX 42650
OLYMPIA, WASHINGTON 98504-2650



LANDSCAPE ARCHITECT



ARCHITECT



STRUCTURAL ENGINEER



ELECTICAL ENGINEER



MECHANICAL ENGINEER



CIVIL ENGINEER

Diana Dupuis,
Director

STATE OF WASHINGTON

WASHINGTON STATE PARKS AND RECREATION COMMISSION

300 Desmond Drive SE • PO Box 42650 • Olympia, WA 98504-2650 • (360) 902-8500
Internet Address: http://www.parks.wa.gov

ADVERTISEMENT FOR BID

Sealed bids will be received for the following project:

PROJECT NUMBER:	SW-C1124
PROJECT TITLE:	Cape Disappointment State Park – Welcome Center and Entrance Improvements
PROJECT DESCRIPTION:	This project includes building a new Welcome Center, expanding admin and shop facilities, constructing a visitor parking lot, improving traffic flow and pedestrian safety, relocating the compaction dumpster, and creating new trails. The goal is to enhance vehicle and pedestrian circulation, improve traffic safety, and expand parking for all vehicle types.
PROJECT LOCATION:	The project is located at Cape Disappointment State Park beginning at the entrance of the park in Ilwaco, Washington 98624 in Pacific County. 244 Robert Gray Dr SW, Ilwaco, WA 98624-9165
ESTIMATED BID RANGE:	$ 3,370,000.00 - $ 3,800,000.00
PROJECT REPRESENTATIVE:	Tim Bell
PROCUREMENT COORDINATOR	Brett Taylor
PREBID WALKTHROUGH:	**10:00 AM on Wednesday, July 23rd, 2025.** Meet at gravel parking lot across (north) of 243 Robert Gray Drive, Ilwaco, WA 98624 (Cape D Café)
SUBMITTAL DUE DATE/TIME:	**1:00 PM on Thursday, August 21, 2025**
ELECTRONIC BIDDING:	Bidders are required to register as vendors on the MRSC Bonfire Procurement Portal https://mrscrosters.bonfirehub.com to be eligible to submit bids. All bid submissions must be completed electronically through the State Parks Public Opportunities section of the portal. Bidders must use the official Bid Proposal Form, provided as part of the electronic bid documents, ensuring that all required fields are properly filled out and submitted before the deadline. (See Bonfire support details further down.)

PLANS, SPECIFICATIONS, ADDENDA, AND PLAN HOLDERS LIST: Contractors can access plans and specifications through the State Parks Public Opportunities-MRSC Bonfire Procurement Portal at https://mrscrosters.bonfirehub.com/portal.

Important: Bidders are encouraged to “Register as a Prime/GC Interest” on the project details page of the MRSC Rosters Bonfire Procurement Portal to be placed on the Bidders List. This service is free for Prime Bidders, Subcontractors, and Vendors interested in bidding on this project.

Additionally, plans and specifications are available through Builders Exchange Washington, Inc. at http://www.bxwa.com. Posted Projects”; “Public Works”, “Washington State Parks and Recreation. Bidders have the option to access Bid Documents, including Specifications and Drawings, at www.parks.wa.gov/contracts by clicking on the Construction Projects link for reference purposes. However, the official channel for bid notifications and addenda is the State Parks Public Opportunities-MRSC Rosters Bonfire Portal, and bidders should rely on it for the most up-to-date information.

PLANS MAY ALSO BE VIEWED THROUGH: Associated Builders And Contractors, Spokane WA; Tri City Construction Council, Kennewick WA; Daily Journal of Commerce, Seattle WA; Weekly Construction Reporter, Bellingham WA; Daily Journal Of Commerce Plan Center, Portland OR; Lower Columbia Contractor Plan Center, Longview WA; Abadan Spokane Plan Center, Spokane WA; ARC Document Solutions, Seattle, WA; Associated General Contractors, Boise, ID; Dodge Construction, Bedford, MA; Hermiston Plan Center, Hermiston, OR; Contractor Plan Center, Clackamas, OR; Wenatchee Plan Center, Wenatchee, WA; Spokane Regional Plan Center, Spokane, WA; Associated General Contractors, Spokane, WA; Walla Walla Valley Plan Center, Walla Wall, WA; Yakima Plan Center, Yakima, WA.

TECHNICAL QUESTIONS regarding this project shall be directed to: Tim Bell, Project Representative at (360) 725-9759, tim.bell@park.wa.gov.

BID RESULTS will be published on the State Parks Public Opportunities-MRSC Rosters Bonfire Portal https://mrscrosters.bonfirehub.com/portal following the bid deadline and in the Construction Projects section at www.parks.wa.gov/contracts after the bid submittal. This practice ensures that those involved and interested can readily view bid outcomes, enhancing transparency and efficiency in the bidding process.

THE STATE OF WASHINGTON PREVAILING WAGE RATES are applicable for this public works project. Bidders are responsible to verify and use the most recent prevailing wage rates. The “Effective Date” for this project is the bid submittal time and date above.

BIDDER RESPONSIBILITY will be evaluated for this project. In determining bidder responsibility, the Agency shall consider an overall accounting of the criteria set forth in Division 00 – Supplemental Responsibility Criteria. Please direct questions regarding this subject to the Project Representative.

MANDATORY 15% APPRENTICE LABOR HOURS of the total labor hours are a requirement of this construction contract. Voluntary workforce diversity goals for this apprentice participation are identified in the Instructions to Bidders. Bidders may contact the Department of Labor & Industries, Apprenticeship Section, to obtain information on available apprenticeship programs.

SUBCONTRACTOR LISTINGS: Per RCW 39.30.060, when the bid proposal combined with any alternates totals one million dollars or more, the Bidder must list the Subcontractors they intend to use for structural steel, rebar installation, heating, ventilation, and air conditioning (HVAC), plumbing, and electrical work on the Subcontractor Utilization List form for this project.

ACCESS EQUITY: The successful Bidder is required to complete their vendor registration in Access Equity, a secure B2GNow online vendor management system. Prime Contractors already registered with B2GNow for any public entity must ensure their information is up to date. The system can be accessed either directly at https://omwbe.diversitycompliance.com/ or via the Office of Minority and Women's Business Enterprises (OMWBE) website at https://omwbe.wa.gov/.

FOR THIS PROJECT, VOLUNTARY DIVERSITY GOALS HAVE BEEN SET: 10% for Minority Business Enterprises (MBE), 6% for Women's Business Enterprises (WBE), 5% for Washington Small Businesses, and 5% for Veteran-owned businesses. While meeting these goals is not mandatory, it is strongly encouraged to promote diversity in business participation.

Bidders may contact the Office of Minority and Women's Business Enterprise (OMWBE) at: http://omwbe.wa.gov/ to obtain information on certified firms. Bidders may also utilize Washington Small Businesses registered in WEBS at https://pr-webs-vendor.des.wa.gov/ and Veteran-owned Businesses at https://www.dva.wa.gov/veterans-their-families/veteran-ownedbusinesses/vob-search.

Washington State Parks reserves the right to accept or reject any or all proposals and to waive informalities.

STATE OF WASHINGTON
PARKS AND RECREATION COMMISSION
CONTRACTS AND GRANTS

For assistance with the Bonfire Vendor Registration Process, please visit the following link: Vendor Registration Support

For guidance on the Bonfire Bid Submission Process, refer to this link: Bid Submission Support

Additional Bonfire Vendor Support resources, including support articles and instructional videos, are available at: Bonfire Vendor Support

If vendors experience any technical issues, they can contact Bonfire Support via email at Support@GoBonfire.com.

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

"ADVERTISEMENT FOR BID" LETTERS

INVITATION TO BID ..... i - iii

INSTRUCTIONS TO BIDDERS ..... 18 pages

BID PROPOSAL FORM ..... 7 pages

SUPPLEMENTAL RESPONSIBILITY CRITERIA ..... 10 pages

GENERAL CONDITIONS ..... 43 pages

PREVAILING WAGE STATEMENT ..... 1 page

AVAILABLE INFORMATION
(Reports, Existing Condition Information, Existing Hazardous Material Information, etc.)

Hazardous Building Materials Survey Report ..... 106 pages

Geotechnical Engineering Report ..... 50 pages

DIVISION 1: GENERAL REQUIREMENTS

Section 010000 – General Requirement ..... 5 pages
Section 010099 – Surveying ..... 2 pages
Section 013233 – Photographic Documentation ..... 3 pages
Section 013300 – Submittal Procedures ..... 3 pages
Section 013501 – Inadvertent Disc Of Cultural Resources and Human Skeletal Remains ..... 5 pages
Section 014000 – Quality Requirements ..... 8 pages
Section 014100 – Regulatory Requirements ..... 2 pages
Section 014200 – References ..... 3 pages
Section 015000 – Temporary Facilities and Controls ..... 5 pages
Section 015526 – Traffic Control ..... 2 pages
Section 015639 – Temporary Tree and Plant Protection ..... 6 pages
Section 015713 – Temporary Erosion and Sediment Control ..... 4 pages
Section 015723 - Temporary Storm Water Pollution Prevention ..... 7 pages
Section 016000 – Product Requirements ..... 9 pages
Section 017329 – Cutting and Patching ..... 5 pages
Section 017419 – Construction Waste Management and Disposal ..... 6 pages
Section 017700 – Closeout Procedures ..... 4 pages
Section 017900 – Demonstration and Training ..... 3 pages

DIVISION 2 – 49: TECHNICAL DIVISIONS

Section 020000 – Existing Conditions ..... 3 pages

Section 024100 – Demolition ..... 5 pages
Section 024120 – Site Demolition and Relocations ..... 4 pages

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

Section 033000 – Cast-In-Place Concrete ..... 10 pages
Section 033353 – Miscellaneous Site Concrete ..... 19 pages
Section 033543 – Polished Concrete Finishing ..... 5 pages

Section 044313 – Stone Masonry Veneer ..... 7 pages

Section 051200 – Structural Steel Framing ..... 5 pages
Section 055000 – Metal Fabrications ..... 5 pages

Section 061000 – Rough Carpentry ..... 5 pages
Section 061500 – Wood Decking ..... 3 pages
Section 061733 – Wood I-Joists ..... 4 pages
Section 061753 – Shop Fabricated Wood Trusses ..... 3 pages
Section 061800 – Glue-Laminated Construction ..... 3 pages
Section 062000 – Finish Carpentry ..... 4 pages
Section 066300 – Plastic Railings ..... 5 pages

Section 071900 – Water Repellents ..... 4 pages
Section 072100 – Thermal Insulation ..... 6 pages
Section 072500 – Weather Barriers ..... 5 pages
Section 074113 – Metal Roof Panels ..... 7 pages
Section 074213 – Metal Wall Panels ..... 5 pages
Section 074646 – Fiber Cement Siding ..... 4 pages
Section 076200 – Sheet Metal Flashing and Trim ..... 6 pages
Section 079200 – Joint Sealants ..... 9 pages

Section 081113 – Hollow Metal Doors and Frames ..... 6 pages
Section 081416 – Flush Wood Doors ..... 5 pages
Section 081613 – Fiberglass Doors ..... 6 pages
Section 083100 – Access Doors and Panels ..... 3 pages
Section 083613 – Sectional Doors ..... 7 pages
Section 085413 – Fiberglass Windows ..... 7 pages
Section 086300 – Metal-Framed Skylights ..... 7 pages
Section 087100 – Door Hardware ..... 12 pages
Section 088000 – Glazing ..... 8 pages

Section 092116 – Gypsum Board Assemblies ..... 6 pages
Section 093000 – Tiling ..... 9 pages
Section 095100 – Acoustical Ceilings ..... 6 pages
Section 096500 – Resilient Flooring ..... 6 pages
Section 096813 – Tile Carpeting ..... 4 pages
Section 099000 – Painting and Coating ..... 8 pages

Section 101423 – Panel Signage ..... 4 pages
Section 102800 – Toilet, Bath, and Laundry Accessories ..... 5 pages
Section 104400 – Fire Protection Specialties ..... 4 pages

Section 113013 – Appliances ..... 3 pages

Section 122113 – Horizontal Louver Blinds ..... 3 pages
Section 123200 – Manufactured Wood Casework ..... 9 pages

Section 133419 – Metal Building Systems ..... 8 pages

Section 220000 – Plumbing Basic Requirements ..... 15 pages
Section 220519 – Plumbing Devices ..... 3 pages
Section 220523 – General Duty Valves for Plumbing Piping ..... 6 pages
Section 220529 – Hangers and Supports for Plumbing Piping and Equipment ..... 6 pages
Section 220533 – Heat Tracing for Plumbing Piping ..... 2 pages
Section 220553 – Identification for Plumbing Piping and Equipment ..... 3 pages
Section 220593 – Testing, Adjusting, and Balancing for Plumbing ..... 3 pages
Section 220700 – Plumbing Insulation ..... 5 pages
Section 221000 – Plumbing Piping ..... 11 pages
Section 223000 – Plumbing Equipment ..... 4 pages
Section 224000 – Plumbing Fixtures ..... 6 pages

Section 230000 – Heating, Ventilating, and Air Conditioning(HVAC)BasicRequirements 14 pages
Section 230529 – Hangers and Supports for HVAC Piping, Ductwork and Equipment ..... 15 pages
Section 230553 – Identification for HVAC Piping, Ductwork and Equipment ..... 5 pages
Section 230593 – Testing, Adjusting, and Balancing for HVAC ..... 17 pages
Section 230700 – HVAC Insulation ..... 13 pages
Section 230933 – Electric and Electronic Control System for HVAC ..... 4 pages
Section 232113 – HVAC Piping ..... 4 pages
Section 233100 – HVAC Ducts and Casings ..... 9 pages
Section 233300 – Air Duct Accessories ..... 9 pages
Section 233400 – HVAC Fans ..... 6 pages
Section 233700 – Air Outlets and Inlets ..... 4 pages
Section 238143 – Air Source Heat Pumps ..... 6 pages
Section 238200 – Terminal Heat Transfer Equipment ..... 5 pages

Section 260000 – Electrical Basic Requirements ..... 14 pages
Section 260509 – Equipment Wiring ..... 3 pages
Section 260519 – Low-Voltage Electrical Power Conductors and Cables ..... 6 pages
Section 260526 – Grounding and Bonding for Electrical Systems ..... 5 pages
Section 260533 – Raceways ..... 11 pages
Section 260534 – Boxes ..... 6 pages
Section 260543 – Electrical Vaults and Underground Raceways ..... 9 pages
Section 260553 – Identification for Electrical Systems ..... 5 pages
Section 260573 – Electrical Distribution Systems ..... 5 pages
Section 260900 – Contractors and Control Devices ..... 6 pages
Section 260923 – Occupancy and Vacancy Sensors ..... 8 pages
Section 262416 – Panelboards ..... 7 pages
Section 262653 – Electrical Vehicle Charging Equipment ..... 7 pages
Section 262713 – Electrical Metering ..... 4 pages
Section 262726 – Wiring Devices ..... 6 pages
Section 265100 – Lighting ..... 10 pages

Section 270000 – Communications Basic Requirements ..... 17 pages
Section 271100 – Communication Equipment Rooms ..... 14 pages

Section 311000 – Site Clearing ..... 4 pages
Section 312000 – Site Earthwork ..... 19 pages

Section 312500 – Erosion and Sedimentation Control ..... 7 pages

Section 321216 – Asphalt Paving ..... 2 pages
Section 321313 – Exposed Oyster Shell Concrete Paving ..... 8 pages
Section 321700 – Paving Specialties ..... 3 pages
Section 323300 – Site Furnishings ..... 2 pages
Section 329300 – Plants ..... 11 pages

Section 331000 – Water Utilities ..... 5 pages
Section 333000 – Sanitary Sewerage ..... 4 pages
Section 334000 – Storm Drainage ..... 4 pages
Section 334100 – Subdrainage ..... 3 pages

END OF SECTION

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

INVITATION TO BID

1.1 SPECIAL NOTICE(S)

A. Cape Disappointment State Park is closing for construction beginning September 17, 2025, and will reopen April 1, 2026. Construction needs to be completed by March 31, 2026.

1.2 DESCRIPTION OF WORK

A. Construction of a new entrance area to Cape Disappointment State Park in Pacific County. The project work includes a new Welcome Center, expansion of the administrative/shop facility, a new visitor parking lot, improvements to entrance circulation and pedestrian safety, relocation of the compaction dumpster, and construction of a trail system. Improvements will establish circulation for vehicles and pedestrians and address traffic safety, free flow of traffic into and out of the park, and provide new parking options for cars, RVs, and trucks with trailers.

1.3 LOCATION OF PROJECT

A. The project is located at Cape Disappointment State Park beginning at the entrance of the park in Ilwaco, Washington 98624.

244 Robert Gray Dr SW, Ilwaco, WA 98624-9165

1.4 TECHNICAL QUESTIONS

A. Direct project questions to:

Direct project questions to Tim Bell, Project Representative at (360) 725-9759, tim.bell@park.wa.gov.

1.5 PRE-BID PROJECT SITE TOUR

DATE:	Wednesday, July 23rd, 2025.
TIME:	10:00 AM.
LOCATION:	Gravel parking lot across (north) of 243 Robert Gray Dr., Ilwaco WA 98624 (Cape D Café)

1.6 BID DEADLINE

A. Bidders must be registered as vendors through the MRSC Bonfire Procurement Portal https://mrscrosters.bonfirehub.com/portal, which is free to sign up for, before submitting their bids electronically through the State Parks Public Opportunities section of the same

portal. All bids must be submitted using the Bid Proposal Form, provided as part of the electronic bid documents. Submissions must fully comply with the requirements outlined in Sections 3.1 and 4.1 of the Instructions to Bidders. Bids are due at **1:00 p.m., Thursday, August 21, 2025**. Late submissions will not be accepted.

B. The Agency does not guarantee a specific timeframe for the public release of bid results; however, they are typically available within three business days of the bid deadline, often on the same day. Bid results can be accessed through the MRSC Bonfire Procurement Portal https://mrscrosters.bonfirehub.com/portal and public notices. Additionally, they may be available on the Washington State Parks website at www.parks.wa.gov/contracts under "Construction Projects – Public Works Bid Results." Bid results may also be shared through Plan Centers, but Bidders should note that the State Parks Public Opportunities - MRSC Rosters Bonfire Procurement Portal serves as the official release point for the Bid Tabulation or Bid Record for this solicitation.

C. The Agency reserves the right to accept or reject all bids and to waive informalities. The Bidder will allow 60 days from bid deadline date for acceptance of its bid by the Agency.

1.7 COVID 19

A. COVID-19 Refer to the Department of Labor & Industries website for requirements regarding any safety plans needed. Novel Coronavirus Outbreak (COVID-19) Resources (wa.gov)

1.8 FOR INFORMATION ON:

A. Bidder Responsibility: Bidder responsibility will be evaluated for this project. In determining bidder responsibility, the Agency will consider an overall assessment of the criteria outlined in Division 00 – Supplemental Responsibility Criteria.

For any questions regarding this topic, please contact the Project Representative or submit a vendor discussion through the State Parks Public Opportunities - MRSC Bonfire Procurement Portal https://mrscrosters.bonfirehub.com/portal. To ensure consideration, all inquiries must be received at least seven (7) working days before the bid deadline.

B. Reciprocal Preference: See Instructions to Bidders 11.1 Reciprocal Preference for Resident Contractors.

C. Apprenticeship Requirements: For projects estimated at or over $1,000,000, Apprenticeship Participation, Mandatory 15 percent apprentice labor, see Instructions to Bidders 5.1B Apprenticeship Participation.

D. Subcontractor Listings: When the base bid combined with any alternates totals $1,000,000 or more, the Bidder must list the Subcontractors they intend to use for structural steel, rebar installation, heating, ventilation, and air conditioning (HVAC), plumbing, and electrical work on the Subcontractor Utilization List form for this project, see Instructions to Bidders 5.1A Subcontractor Listing.

E. MWBE goals: See Instructions To Bidders 12.1 Minority And Women's Business

Enterprise (MWBE) Utilization. For Veteran-Owned and Small Business utilization, see Instruction to Bidders 12.2.

F. Modification of Bid: See Instructions to Bidders 6.3 Modification of Bid.

G. Withdrawal of Bid: See Instructions to Bidders 6.4 Withdrawal of Bid.

H. Bid Guarantee: See Instructions to Bidders 4.1 Bid Bond. No particular bid bond form is required.

I. Bid Tabulation and Bid Record: See Instructions to Bidders 7.1B for Bid Tabulation, Bid Record, and Announcement of Apparent Low Bid.

J. Records Request: All submitted bids are subject to public records request once the lowest bidder has been determined and officially announced. See Instructions to Bidders 7.1D Records Request.

1.9 ACCESSIBILITY

A. Sites may not be fully accessible to people with disabilities. Please contact the Project Representative at least five (5) days prior to scheduled pre-bid tour if special accommodation is required for your attendance.

END OF SECTION

1.1 BIDDER DEFINED

A. A "*Bidder*" is an entity or person who submits a bid proposal for the work described in the contract documents.

B. The Bidder must be registered with the Washington State Department of Labor and Industries in accordance with RCW 18.27.020. The contractor registration number, expiration date, Uniform Business Identifier (UBI) number, and federal tax identification number must be entered in the applicable spaces on the Bidder Compliance Form within the Bid Proposal Form.

2.1 EXAMINATION OF THE WORK SITE AND BIDDING DOCUMENTS

A. Bidder acknowledges that it has taken steps necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and road; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during the work.

The bidder also acknowledges that it has satisfied itself as to character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including exploratory work done by the Agency, as well as from the drawings and specifications made a part of this contract. Any failure of the Bidder to take the actions described and acknowledged in this paragraph will not relieve the Bidder from responsibility for estimating properly the difficulty and cost of successfully performing the work.

B. No statement by any officer, agent, or employee of the Agency pertaining to the physical conditions of the site of the work will be binding on the Agency other than those statements issued in the contract documents.

C. Bidders shall promptly notify the Agency of ambiguities, inconsistencies, or errors, if any, which they may discover upon examination of the Bidding Documents or of the site and local conditions.

D. Interpretations and Clarifications

1) Prospective Bidders seeking clarification or interpretation of the solicitation, drawings, or specifications must submit a written request to the Project Representative listed in the Invitation to Bid or through the **State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal** https://mrscrosters.bonfirehub.com/portal by submitting a vendor discussion. Requests must be received at least seven (7) working days prior to the bid deadline to be considered.

2) Any Agency responses that do not modify the Scope of Work outlined in the contract documents may be posted on the State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal prior to the bid submission deadline. Such clarifications will not be considered part of the contract documents and do not need to be acknowledged by Bidders in their Bid Proposal Form. The Agency retains sole discretion to determine whether a clarification or interpretation affects the Scope of Work and requires inclusion in the Contract Documents.

3) Changes to the Scope of Work or schedule described in the contract documents will only be issued as written ADDENDA.

4) Oral interpretations or clarifications are not legally binding.

E. Substitutions

1) The product, equipment, materials, or methods described or noted within the Bidding Documents, whether currently available or not, are to establish a standard of quality, function, appearance and dimension. A proposed substitution shall have equal attributes in all respects.

2) No substitution will be considered unless a written request for approval is submitted by the Contractor, after Award, in accordance with the applicable provisions of Section 012500 of the specifications. If no Section 012500 is available, then see section 016000 Product Requirements, sub-section 1.5. Each such request shall describe the proposed substitution in its entirety including name of the material or equipment, drawings, catalog cuts, performance or test data and all other information required for an evaluation. The submittal shall also include a statement noting all changes required in adjoining, dependent or other interrelated work necessitated by the incorporation of the proposed substitute. The Bidder shall bear the burden of proof of merit of the proposed substitution. The Project Representative's decision of approval or disapproval of a proposed substitution shall be final.

3.1 BID PROPOSAL

A. Bidders must be registered as vendors through the **MRSC Rosters Bonfire Procurement Portal** https://mrscrosters.bonfirehub.com/portal. All bid submissions must be made through the State Parks Public Opportunities section on the same portal. The individual who signs and submits the bid through the Bonfire Portal must be an authorized designee responsible for the bid submission.

B. All bidders for Small Works Projects must be currently registered on the MRSC Small Works Roster (vendor list) found http://mrscrosters.org/.

C. Bidders are required to submit bid prices electronically through the **State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal**. Submissions must be completed using the Bid Proposal Form, provided as part of the electronic bid proposal documents. The Bid Proposal Form is a spreadsheet consisting of four tabs:

1. Bidder Compliance Form
2. Bid Form
3. MWBE
4. Subcontractor Utilization (if applicable)

All fields in the Bid Proposal Form tabs must be properly and completely filled out to ensure compliance. Failure to fill in all required fields may result in the bid being deemed non-responsive.

The Bidder Compliance Form must include the Bidder's full and complete address and information, typed in the spaces provided. The Bid Form must be electronically signed in the firm's name, and a typewritten name is acceptable as an electronic signature, provided it complies with electronic submission requirements.

Once the Bid Proposal Form is completed, it must be uploaded in its original form to the appropriate section of the State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal https://mrscrosters.bonfirehub.com/portal. Bidders are reminded to thoroughly review their submission before uploading to ensure compliance with all instructions and requirements. Incomplete submissions will be deemed non-responsive.

D. Except as otherwise provided in these instructions, bid proposals that are incomplete, or that are conditioned in any way, or that contain alterations, or items not called for in the contract documents, or that do not conform to the call for bids, may be rejected as non-responsive at the discretion of the Agency unless the law requires that the omission be deemed non-responsive, in which case the bid will be rejected as non-responsive. Only the amounts and information asked for on the Bid Proposal Form and the plans and specifications furnished will be considered as the bid. Bid amounts include all taxes imposed by law, **except** for Washington Sales Tax unless noted otherwise.

E. Each Bidder must submit their bid exactly as specified and as provided in the Bid Proposal Form. Bidders are required to include bids for all alternates if alternates are indicated on the Bid Form. For alternates that have no charge, the Bidder must type "**$0.00**" in the column for the unit price on the Bid Form.

F. Bidders shall acknowledge receipt of any ADDENDA to the solicitation for bids on the Bid form. Failure to do so may result in the bid being declared non-responsive.

G. Substitute bid forms will not be considered unless this solicitation authorizes their submission.

H. The bid prices listed in the Bid Form must include all labor, materials, equipment, overhead, and compensation necessary to complete the work for each item, while the costs for the building permit and public utility hookup fees will either be reimbursed directly to the Contractor or paid by the Agency to the permitting agency and therefore should not be included in the bid amount.

I. The low Bidder, for purposes of award, shall be the responsive and responsible Bidder offering the low aggregate amount for the base bid item, plus additive or deductive bid alternates selected by the Agency, and within funds available for the project. The Bidder agrees to hold all bid alternate prices for sixty (60) days from date of bid deadline.

4.1 BID GUARANTEE: BID BOND

A. A bid bond is not required when the total bid amount, including the base bid and all additive alternates, is $35,000 or less. In such cases, instead of providing a bid bond, Bidders must complete and upload the **Bid Bond Requirement Statement** as part of their bid submission. This ensures compliance with the bidding requirements for projects below the $35,000 threshold.

B. When the sum of the base bid plus all additive alternates is greater than $35,000.00, a bid guarantee in the amount of 5% of the base bid amount is required. Failure of the Bidder to provide bid guarantee when required shall render the bid non-responsive.

C. Acceptable forms of bid guarantee are: A bid bond. A scanned copy (e.g., PDF) of the bid bond must be uploaded to the State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal (https://mrscrosters.bonfirehub.com/portal) along with your bid response to the Agency. See also, Section 6.1 SUBMISSION OF BID.

D. The Bidder will allow 60 days from bid deadline for acceptance of its bid by the Agency.

E. Should the successful Bidder fail to enter into a contract and furnish a satisfactory performance bond within 15 days after receiving properly prepared contract forms from the Agency, the bid bond may be forfeited as liquidated damages for advertisements and administration of bid procedures. Additionally, the Agency reserves the right to terminate the contract award.

F. Bid bonds must be held for the three low bids for 30 days or until a contract is executed with the successful Bidder. All other bid bonds will be released or returned to the Bidders within 15 days of the bid deadline.

5.1 REQUIREMENTS FOR PROJECTS ESTIMATED AT $1,000,000 OR MORE

A. SUBCONTRACTOR LISTING

Pursuant to RCW 39.30.060, if the base bid combined with the sum of the alternates exceeds one million dollars ($1,000,000.00) or more for the construction, alteration, or repair of any public building or public work of the state shall require each Bidder to submit as part of the bid the names of subcontractors with whom the Bidder, if awarded the contract, will subcontract for performance of the work of heating, ventilation and air conditioning, plumbing, and electrical, structural steel installation, rebar installation or to name itself for the work. The Bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the Bidder must indicate which subcontractor will be used for which alternate.

Subcontractor listing is not required for Small Works Projects under $350,000.

Failure of the Bidder to submit as part of the bid, the names of such subcontractors, or to name itself to perform such work, or the naming of two or more subcontractors to perform the same work, or failure to sign the form shall render the bid as non-responsive and therefore void.

B. APPRENTICESHIP PARTICIPATION

In projects estimated to cost one million dollars ($1,000,000.00) or more, be aware that the following requirements will be part of the resulting contract.

Apprenticeship requirements do not apply to Small Works Projects estimated below $350,000.

In accordance with RCW 39.04.320 (Apprenticeship Training Programs), for all public works estimated by the Agency Project Engineer to cost **one million dollars or more,** the state of Washington requires no less than **15% of the labor hours be performed by apprentices.** A contractor or subcontractor may not be required to exceed the 15% requirement. The bid advertisement and Bid Proposal Form shall establish a minimum required percentage of apprentice labor hours compared to the total labor hours. The project's apprenticeship utilization rate is calculated using the approved affidavits from the L&I portal.

1. **Incentives** - The Contractor who meets or exceeds this utilization requirement on eligible contracts, will be awarded a monetary incentive described in the Apprentice Utilization Requirements section of the Bid Proposal Form.

2. **Penalties** - The Contractor who fails to meet the utilization requirement and fails to demonstrate a Good Faith Effort, as outlined below, is subject to penalties described in the Apprentice Utilization Requirements section of the contract Bid Proposal Form. Contractor will receive an invoice payable to the Agency within 30 days. The contractor will have 30 days to pay the penalty invoice at the time of receipt before the penalty is considered outstanding. Contractors with outstanding apprenticeship penalties may be considered non-responsive.

3. **Cost Value** - The expected cost value associated with meeting the goal is included in the Base Bid as described on the Bid Proposal Form.

4. **Utilization Plan** - The Contractor shall provide an Apprentice Utilization Plan (Plan) demonstrating how and when they intend to achieve the Apprenticeship Utilization Requirement. The Plan shall have enough information to track the Contractor's progress in meeting the utilization requirement. The Contractor shall submit the Plan on the Apprentice Utilization Plan template within 10 business days of Notice to Proceed of the contract and prior to submitting the first invoice. The Contractor shall provide an updated Plan during the course of construction when there are significant changes to the Plan which may affect their ability to meet the requirement.

    a) The Plan shall be uploaded to the Department of Labor & Industries' (L&I): ***Prevailing Wage Intents and Affidavit (PWIA) system on L&I's website.***

    b) The Plan is not submitted for approval.

    c) It is expected that the Contractor will actively seek out opportunities to meet the Apprentice Utilization Requirement during construction even if the Plan indicates a shortfall in meeting the requirement.

    d) If the Plan indicates that the Contractor will not attain the Apprentice Utilization Requirement, then Contractor must submit "Good Faith Effort" (GFE) documentation with their Plan to L&I's PWIA system.

C. APPRENTICESHIP - GOOD FAITH EFFORT (GFE)

1. **Good Faith Effort (GFE)** documentation shall describe in detail why the Contractor is not or was not able to attain the Apprentice Utilization Requirement.

    a) Contractors may submit Good Faith Effort (GFE) documentation at any time during the construction.

    b) All GFE documentation must be submitted no later than 30 days before substantial completion.

    c) Only the awarding Agency can approve GFEs. The Department of Labor & Industries (L&I) may provide assistance but does not have approval authority

    d) The Awarding Agency must document its GFE decision in writing, including any monetary penalty if denied.

e) Good Faith Effort (GFE) documentation must be in signed letter format uploaded to the PWIA system and include:

1. The contract number, title and the apprentice utilization requirements,

2. The amount of apprentice labor hours the contract can or did attain along with the percentage of labor hours,

3. Contractors may receive a GFE credit for graduated Apprentice hours through the end of the calendar year for all projects worked on as long as the Apprentice remains continuously employed with the same Contractor they were working for when they graduated. If an Apprentice graduates during employment on a project of significant duration, they may be counted towards a GFE credit for up to one year after their graduation or until the end of the project (whichever comes first). Determination of whether or not Contract requirements were met in good faith will be made by subtracting the hours from the journeyman total reported hours for the project and adding them to the apprentice hour total. If the new utilization percentage meets the Contract requirement, the Contractor will be reported as meeting the requirement in good faith,

4. Anticipated or actual shortfall (in apprentice labor hours and percentage) and the reason(s) for not attaining the required apprentice labor hours,

5. Information from one or more of the following areas:

   (a) Names of any State-Approved Apprentice Training Programs contacted with the name(s) of person(s) contacted and dates of contacts, and a copy of each response from the Training Program(s),

   (b) Reference Contract Specifications or documents that affected the Contractor's ability to attain apprentice utilization,

   (c) Discuss efforts the Contractor has taken to require Subcontractors to solicit and employ apprentices,

6. Backup documentation to the letter consisting of the following:

   (a) Letters, emails, phone logs including names dates and outcomes, posters, photos, payrolls, timecards, schedules, copies or references to other contract specifications or documents.

Additional Resource Information

(a) For questions regarding how to complete the Apprentice Utilization Plan template or Good Faith Effort documentation, please contact the Project Manager listed in the Bid Advertisement.

(b) Step-by-step instructions on how to access and navigate the L&I's PWIA system, including uploading required documents can be found on the L&I website.

(c) Additional information about apprentice utilization on Public Works Project can be found on the L&I website.

6.1 SUBMISSION OF BID

A. Bids must be submitted on or before the time as specified in the Invitation to Bid.

B. Bid responses will only be accepted electronically through the State Parks Public Opportunities section using the MRSC Rosters Bonfire Procurement Portal as specified in the Invitation to Bid. https://mrscrosters.bonfirehub.com/portal.

C. People with disabilities who wish to request special accommodation, (e.g., sign language interpreters, braille, etc.) need to contact the Agency ten (10) working days prior to the scheduled bid deadline.

D. In the event the MRSC Rosters Bonfire Procurement Portal is unavailable to all users at the bid submittal deadline, the Agency will contact the Bidders within 24 hours and the Agency will extend the bid submittal time.

E. Neither Agency nor MRSC Rosters Bonfire Procurement Portal can guarantee the availability of Internet connectivity or related telecommunication and hosting services and will not be liable or responsible if the Bidder and its representative(s) or designee(s) cannot connect to the MRSC Rosters Bonfire Procurement Portal.

F. The Bidder must comply with the MRSC Rosters Bonfire Portal's Terms of Service (https://gobonfire.com/termsservice/) when submitting the Bid through the MRSC Rosters Bonfire Procurement Portal.

6.2 BID CLOCK:

A. After the 1 P.M. bid deadline, which serves as the official bid clock to determine timely submission, Agency staff will review the bids. The MRSC Rosters Bonfire Procurement Portal does not permit submissions after the deadline, so bidders must ensure their bids are submitted on time. Late submissions will not be accepted under any circumstances.

B. CAUTION: To avoid issues, submit your bid response electronically well in advance of the deadline to account for potential technological delays, slow-downs, or malfunctions. Bids received after the deadline, regardless of the reason or responsibility, will be rejected.

6.3 MODIFICATION OF BID

A. Bidders may update their bid electronically via the MRSC Rosters Bonfire Procurement Portal before the bid due date.

Modifying: Modifying refers to altering information already contained in a submitted bid. If your submission has been finalized but needs modifications, you may update it electronically before the bid due date by navigating to the Submissions page and un-submitting your submission.

NOTE: Un-submitting removes your original bid, so ensure you resubmit before the deadline. Only upload updated files; unchanged files remain in place. A new confirmation email will be sent upon resubmission.

6.4 WITHDRAWAL OF BID

A. Withdrawal refers to a bid that has already been submitted to the Agency. A bid response may be withdrawn electronically by the Bidder's authorized representative before the Bid Deadline (due date) for the bid. The FAILURE TO WITHDRAW a bid prior to the bid due date deadline exposes the Bidder to the possibility that the Agency will make a demand against the Bidders bid bond.

B. Procedure for Withdrawing a Bid After Bid Deadline Due to Error: If a Bidder discovers an error in its bid following the bid deadline, the Bidder must submit written notification of the withdrawal to contracts@parks.wa.gov within 24 hours following the bid deadline. Follow the example subject line. Example email subject line: SW-C9999 Withdraw Bid ACME Construction Inc.

- The Bidder must provide written documentation of the claimed error to the satisfaction of the Agency within 72 hours following the bid deadline.

- The Agency will approve or disapprove the request for withdrawal of the bid in writing. If the Bidder's request for withdrawal of its bid is approved, the Bidder will be released from further obligation to the Agency without penalty. If it is disapproved, the Agency may retain the Bidder's bid bond.

6.5 REJECTION OF BID

A. The Agency reserves the right to reject any or all bids and to waive informalities in connection with the bids.

7.1 BID EVALUATION AND AWARD OF CONTRACT

A. Award of contract will be made by the Agency based upon any combination of the base bid and alternates that, in the Agency's sole discretion, is in the Agency's best interest considering price, schedule, and other factors. The numbering of the alternates in the bid proposal bears no relationship to the order in which the alternates may be selected by the Agency. Additionally, the Agency reserves the right to negotiate base bid prices (including changes to the contract plans and specifications) with the low responsive, responsible Bidder to bring the final contract amount within the funds available per RCW 39.04.015.

B. BID TABULATION, BID RECORD AND ANNOUNCEMENT OF APPARENT LOW BID:

The Agency does not guarantee when the Bid results will be released to the public. The bid results are usually released within three business days of the bid deadline and often the same day. Bid results can be obtained from MRSC Rosters Bonfire Procurement Portal (https://mrscrosters.bonfirehub.com/portal) and viewing public notices. Bid Results may also be obtained by accessing the Washington State Parks webpage at www.parks.wa.gov/contracts (see "Construction Projects- Public works bid results"). The Bid results may also be released through the Plan Centers. But, Bidders are cautioned that the State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal is the official release point for the Bid Tabulation or Bid Record for this solicitation.

The bid tabulation will identify all bids received by the Agency. Bids that were not rejected and not withdrawn prior to the bid deadline will be ranked by base bid price. The first three lowest base bids will reflect detailed pricing information. The remaining Bidders will reflect only the base bid pricing. Bids that were rejected for any reason will reflect **Non-Responsive** in the bid tabulation but may include its total pricing.

The bid record will list all bids received, ordered alphabetically. Rejected bids will not show detailed pricing. The bid record is used for projects with Alternates. The Agency may consider Alternate Bid Items in any combination. The low Bidder for award purposes is the responsive Bidder offering the lowest aggregate amount for the base bid plus selected alternates, within available project funds.

Release of the Bid Tabulation or Announcement of the Apparent Low bid information that a Firm was identified as the apparent low base bid simply means that at this point in time the Agency believes the subject bid was the lowest cost responsive bid, but designation as the apparent low responsive bid is not a guarantee of a contract with the Agency. The Agency reserves the right to reevaluate the bid and determine whether the bid was responsive and responsible and successful as first thought. The Bidder identified as the apparent low responsive bid is cautioned not to commit funds, resources, and effort prior to receiving an actual executed contract. The Bidder identified as the apparent low responsive bid that commits funds, resources, and effort prior to a contract do so at its own risk and peril.

Within two (2) business days following the day of the release of the Bid Tabulation/Bid Record or the Announcement of the Apparent Low bid, the Bidder may file a Protest (Protest procedures are outlined in Section 9.1).

C. REJECTION LETTER & PROTEST: No matter the phase of the evaluation, if the Agency determines that the bid is not responsive or the Bidder is not responsible, the Agency will reject the bid/bidder, and send the bidder a Rejection Letter explaining why the bid/bidder was rejected. Within two (2) business days following the day of the release of the Rejection Letter, the Bidder may file a Protest, provided it meets one of the three (3) protest grounds (Protest procedures are outlined in Section 9.1 E.). The Rejection Letter will be sent by email/email attachment to the email address provided by the Bidder in the Bidder's bid response.

D. RECORDS REQUEST: All submitted bids are subject to public records request once the lowest bidder has been determined and officially announced.

After the announcement of the lowest bidder, any member of the public may request access to the bid documents. No official format is required for making a records request; however, the Agency recommends that requests be made through the Public Records Request Center on our website:https://parks.wa.gov/about/contact-us/public-records-requests.

E. The intent of the Agency is to award a contract to the low responsive, responsible bidder.

8.1 RESPONSIVE AND RESPONSIBLE BIDDER

A. The Agency will evaluate bids responsiveness and responsibility in the MRSC Rosters Bonfire Procurement Portal https://mrscrosters.bonfirehub.com/portal.

B. RESPONSIVE - A bid will be considered responsive if its electronic response meets the following requirements:

1. It is received at the proper submittal time, date and location online through the State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal.

2. It meets the required requested information of the Bid Proposal Form through the State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal.

3. It meets the requirements as stated in section 3.1. of the Instructions To Bidders.

4. It is submitted by a licensed/registered contractor within the state of Washington at the time of bid deadline and is not banned from bidding by the Department of Labor and Industries.

5. It is accompanied by a bid guarantee, if required.

If inconsistencies or errors are noted in the bid proposal prices, the **unit and lump sum prices have precedence over their total amounts**; and the **total amounts have precedence over the total base bid**.

The apparent low Bidder, for purpose of award, is the responsive and responsible Bidder offering the low aggregate amount for the base bid plus selected additive or deductive bid alternates and meeting all other bid submittal requirements.

C. RESPONSIBLE – Before award of a public works contract, a Bidder must meet the following **mandatory responsibility criteria** under RCW 39.04.350 (1) & (2) to be considered a responsible Bidder and qualified to be awarded a public works project. The individual who has signed/submitted the Bid through the State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal shall be the authorized designee responsible for bid submissions. The Bidder must:

1. At the time of bid submittal, have a certificate of registration in compliance with RCW 18.27, a plumbing contractor license in compliance with RCW 18.106, an elevator contractor license in compliance with RCW 70.87, or an electrical contractor license in compliance with RCW 19.28 as required under the provisions of those chapters;

2. Have a current state Unified Business Identifier (UBI) number;

3. If applicable, have industrial insurance coverage for the Bidder's employees working in Washington as required in RCW 51; an employment security department number as required in RCW 50; and a state excise tax registration number as required in RCW 82;

4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3);

5. If bidding on a public works project subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington State Apprenticeship and Training Council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under Chapter 49.04 RCW for the one-year period immediately preceding the date of the bid solicitation; and

6. Public Works and Prevailing Wage Training/Exemption. Bidders shall have received training on the requirements related to public works and prevailing wage under this chapter and chapter 39.12 RCW. The bidder must designate a person or persons to be trained on these requirements. The training must be provided by the department of labor and industries or by a training provider whose curriculum is approved by the department. The department, in consultation with the prevailing wage advisory committee, must determine the length of the training. Bidders that have completed three or more public works projects and have had a valid business license in Washington for three or more years are exempt from this subsection. The department of labor and industries must keep records of entities that have satisfied the training requirement or are exempt and make the records available on its website. Responsible parties may rely on the records made available by the department regarding satisfaction of the training requirement or exemption.

https://lni.wa.gov/licensing-permits/public-works-projects/contractors-employers/contractor-training

7. Within the three-year period immediately preceding the bid solicitation, not have been determined by a final a binding citation and notice of assessment issued by the department of labor and industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of Chapters 49.46, 49.48, or 49.52 RCW. By signing the Bid Proposal Form, the bidder verifies under penalty of perjury, pursuant to RCW 9A.72.085. that the bidder is in compliance with this subsection

8. **Supplemental Responsibility Criteria**: In addition to the mandatory Bidder responsibility, the Agency may adopt relevant supplemental criteria for determining Bidder responsibility applicable to a particular project which the Bidder must meet (RCW 39.04.350 (3)).

   a. If applicable, the Agency shall consider an overall accounting of the attached supplemental criteria for determining Bidder responsibility "DIVISION 00 SUPPLEMENTAL RESPONSIBILITY CRITERIA".

   b. At least seven (7) days prior to the bid submittal deadline, a potential Bidder may request that the Agency modify the supplemental responsibility criteria. The Agency will evaluate the information submitted by the potential Bidder and respond before the bid submittal deadline. If the evaluation results in a change of the criteria, the Agency will issue an ADDENDA to the bidding documents identifying the new criteria. The Addendum will be posted as a public notice in the State Parks Public Opportunities-MRSC Rosters Bonfire Procurement Portal.

   c. Upon the Agency's request, the apparent low Bidder must supply the requested responsibility information within two (2) business days of request by the Agency. Withholding information or failure to submit all the information requested within the time provided may render the bid non-responsive and the bid/Bidder may be rejected by Rejection Letter. The rejection is specific to this project and will have no effect on other or future projects.

   d. The Agency will not execute a contract with any other Bidder until two (2) business days after the Bidder determined to be not responsible has received the rejection letter.

9.1 PROTEST PROCEDURES

A. GENERAL:

This protest process is a courtesy provided by the Agency and it is not governed by Washington's Administrative Procedures Act (APA), RCW 34.05, nor does it confer any additional rights above and beyond what the Bidder already enjoys as a taxpayer. The purpose of this process is to allow the Agency to correct evaluation process errors and problems before a contract is executed.

Only a Bidder may file a protest regarding this solicitation.

The Bidder must strictly adhere to the protest process as set forth herein, the failure of which may result in a summary determination that the protest is without merit without an opportunity to cure.

B. FORM AND CONTENT:

All protests must:

- Be in writing.
- The protest must state and clearly articulate the grounds for the protest with specific facts and complete statements of the action(s) being protested.
- A description of the relief or corrective action being requested should also be included.
- All protests shall be addressed to the Procurement Coordinator.

C. CONTENT LIMITATIONS:

The Agency does not currently mandate any page limitation. However, the protest must be clearly articulated, succinct, organized, logical, and professional.

The Agency will reject protests that:

- fail to state and clearly articulate at least one of the three GROUNDS;
- contain rants, attacks, and/or disparaging or abusive remarks;
- include multiple attachments or references (document dumping, document overload); or,
- appear to require the reader piece together voluminous amounts of material to decipher the argument being made.

D. SUBMISSION OF PROTEST:

- All protests must be submitted within two (2) business days following the day of the release of the Bid Tabulation/Announcement of the Apparent Low bid or after the formal Rejection Letter is sent. For purposes of timing the day of the release of the Bid Tabulation or the day of the Rejection Letter is sent to the Bidder shall not count.
- Bidders must send all protests to: contracts@parks.wa.gov. See also Subject Line.
- SUBJECT LINE: Must include the bid's identification number, and "PROTEST" in the subject line. Failure by the Bidder to include this information in the subject line may result in Bidder's protest not being timely recognized.

E. GROUNDS WHICH MAY BE PROTESTED:

- Conflict of Interest on the part of Agency staff.
- Errors in computing the score.
- Non-compliance with procedures described in the procurement document.

Protests will be rejected as without merit if they do not clearly and convincingly meet one of the GROUNDS above and/or seems to address issues such as:

- An evaluator's professional judgment on the quality of a response, or
- The Agency's assessment of its own and/or other agencies' needs or requirements, or,
- Issues, concerns, objections, or requests for changes that were or could have been addressed prior to the bids due date deadline.

Protests that do not clearly and convincingly meet the requirements and standards described herein are without merit and may be rejected.

F. MANAGER ASSIGNMENT AND REVIEW:

Upon receipt of a protest that meets the requirements described herein, a protest review will be held by the Agency. The Agency will assign a Manager. The Manager is responsible for reviewing and investigating the Bidder's written protest and may meet with agency staff or the agency program that was involved in the solicitation. The Manager may consider the record and all reasonably available facts and will issue a protest determination in writing within fifteen (15) business days from receipt of the protest. If additional time is needed, the Manager will notify the protesting party of the need for additional time within 15 business days from receipt of the protest.

In the event a protest may affect the interest of another Bidder that submitted a response, the Agency may reach out to that Bidder, may provide an unedited copy of the protest to that Bidder, and may invite that Bidder to submit its views and any relevant information on the protest to the Manager.

G. PROTEST DETERMINATION AND FINDINGS AND DISSEMINATION:

The Manager's protest determination may:

- Find the protest lacking in merit and reject the protest;
- Find only technical or harmless errors in the Agency's acquisition process and determine the Agency to be in substantial compliance and reject the protest; OR
- Find merit in the protest and provide THE AGENCY options which may include:
    - Correcting the errors and re-evaluating all responses;
    - Canceling the solicitation and possibly for a new solicitation to take place; OR
    - Making other findings and determining other courses of action as appropriate.

If the Agency rejects the protest, the Agency will enter into a contract with the Apparent Successful Bidder no sooner than two (2) business days after issuance of the protest determination by email to the protesting party at the email address indicated on the party's bid documents. For the purposes of timing, the date the protest determination is sent to the protesting party shall not count.

Dissemination: The Agency will disseminate the decision to all interested Bidders vie email/email attachment to the email address provided by the Bidder in the Bidder's bid response.

H. AGENCY DECISION IS FINAL:

The Manager's protest determination constitutes the agency's final decision regarding the protest. If the protesting party disagrees with the protest determination, the Bidder may seek judicial relief in the Washington Superior Court for Thurston County within two (2) business days of the issuance of the protest determination.

I. STRICT COMPLIANCE

Strict compliance with these protest procedures is essential in furtherance of the public interest. Any aggrieved party that fails to comply strictly with these protest procedures is deemed, by such failure, to have waived and relinquished forever any right or claim with respect to alleged irregularities in connection with the solicitation or award of the Contract. No person or party may pursue any judicial or administrative proceedings challenging the solicitation or award of this Contract, without first exhausting the administrative procedures specified herein.

J. REPRESENTATION

An aggrieved party may participate personally or, if a corporation or other artificial person, by a duly authorized representative. Whether or not participating in person, an aggrieved party may be represented, at the party's own expense, by counsel.

K. COMPUTATION OF TIME

In computing any period of time prescribed by this procedure, the day of the act or event from which the designated period of time begins to run is not included. The last day of the period is included. The term "business day" does not include Sunday, Saturday, or Washington State recognized holiday.

L. ACKNOWLEDGEMENT

By submitting a bid in response to this solicitation, the Bidder acknowledges that it has reviewed and acquainted itself with the bid protest procedures herein and agrees to be bound by such procedures as a condition of submitting a bid.

10.1 EXECUTION OF CONTRACT

A. The successful bidder will be required to execute the contract and furnish performance bond and insurance certificate satisfactory to the Agency within 15 days after receiving properly prepared contract documents from the Agency.

11.1 RECIPROCAL PREFERENCE FOR RESIDENT CONTRACTORS

A. In accordance with RCW 39.04.380 the State of Washington is enforcing a Reciprocal Preference for Resident Contractors. Any public works bid received from a nonresident contractor from a state that provides an in-state percentage bidding preference, a comparable percentage disadvantage must be applied to the bid of that nonresident contractor.

A nonresident contractor from a state that provides a percentage bid preference means a contractor that:

a) is from a state that provides a percentage bid preference to its resident contractors bidding on public works contracts.

b) at the time of bidding on a public works project, does not have a physical office located in Washington.

The state of residence for a nonresident contractor is the state in which the contractor was incorporated or, if not a corporation, the state where the contractor's business entity was formed, and for an individual, the individual's state of residence.

All nonresident contractors will be evaluated for out of state bidder preference. If the state of the nonresident contractor provides an in-state contractor preference, a comparable percentage disadvantage will be applied to their bid prior to contract award.

This section does not apply to public works procured pursuant to RCW 39.04.155, 39.04.280, or any other procurement exempt from competitive bidding.

B. A Comparable Percentage Disadvantage (CPD) will be applied to the bid of that nonresident contractor. The CPD is the in-state contractor percent advantage provided by the contractor's home state. For the purpose of determining the successful bidder, multiply the Nonresident Contractor bid amount by the CPD. The "bid amount" is be the total of the base bid and all accepted alternate bid items. The CPD is added to the Nonresident Contractor bid amount which equates to the Nonresident Disadvantage Total. The Nonresident Disadvantage Total is compared to the Washington contractor bid amounts. The bidder with the lowest total is the successful bidder. See example below.

Alaska Nonresident Contractor Bid Amount	$100,000
Multiplied by the Alaska CPD	x 0.05
Alaska CPD Total	$ 5,000
Alaska Nonresident Contractor Bid Amount	$100,000
Alaska CPD Total	$ 5,000
Nonresident Disadvantage Total	$105,000*

* Note – If the Nonresident Disadvantage Total is lower than all other Washington contractor bid amounts, the Alaska Nonresident Contractor is the successful bidder and will be awarded a contract for the bid amount of $100,000.

If the Nonresident Disadvantage Total is higher than a Washington contractor bid amount, the successful Washington bidder will be awarded a contract for the bid amount.

12.1 MINORITY AND WOMEN'S BUSINESS ENTERPRISE (MWBE) UTILIZATION

In accordance with the legislative findings and policies set forth in Chapter 39.19 RCW, the State of Washington encourages participation in contracts by MWBE firms certified by the Office of Minority and Women's Business Enterprises (OMWBE). Participation may be either on a direct basis in response to this solicitation/invitation or as a subcontractor to a Bidder. However, unless required by federal statutes, regulations, grants, or contract terms referenced in the contract documents, no preference will be included in the evaluation of bids, no minimum level of MWBE participation is required as a condition for receiving an award, and bids will not be rejected or considered non-responsive on that basis. Any affirmative action requirements set forth in federal regulations or statutes included or referenced in the contract documents will apply.

WASHINGTON STATE PARK AND RECREATION COMMISSION
PUBLIC WORKS PROJECT

A. VOLUNTARY MWBE GOALS

1. The following voluntary numerical MWBE participation goals have been established for this solicitation:

   MBE 10% WBE 6%

2. These goals are voluntary, but achievement of the goals is encouraged. Bidders may contact OMWBE at http://omwbe.wa.gov/ to obtain information on certified firms.

B. REPORTING REQUIREMENTS

1. If any part of the contract, (including the supply of materials and equipment) is subcontracted using certified MWBE firms during completion of the work, then prior to final acceptance or completion of the contract or as otherwise indicated in the contract documents the Bidder shall submit a statement of participation indicating that MWBEs were used and the dollar value of their subcontracts.

2. The provisions of this section are not intended to replace or otherwise change the requirements of RCW 39.30.060. If said statute is applicable to this contract then the failure to comply with RCW 39.30.060 will still render a bid non-responsive.

C. RECORD KEEPING

1. The Bidder shall maintain, for at least three years after completion of this contract, relevant records and information necessary to document the level of utilization of MWBEs and other businesses as subcontractors and suppliers in this contract as well as any efforts the Bidder makes to increase the participation of MWBEs. The Bidder shall also maintain, for at least three years after completion of this contract, a record of all quotes, bids, estimates, or proposals submitted to the Bidder by all businesses seeking to participate as subcontractors or suppliers in this contract. The State shall have the right to inspect and copy such records. If this contract involves federal funds, Bidder shall comply with all record keeping requirements set forth in any federal rules, regulations, or statutes included or referenced in the contract documents

D. SUGGESTED EFFORTS TO INCREASE PARTICIPATION BY MWBEs

1. Bidders are encouraged to advertise opportunities for subcontractors or suppliers in a manner reasonably designed to provide MWBEs capable of performing the work with timely notice of such opportunities, and all advertisements shall include a provision encouraging participation by MWBE firms. Advertising may be done through general advertisement (e.g., newspapers, journals, etc.) or by soliciting bids directly from MWBEs.

2. Additional Voluntary Efforts. Bidders are encouraged to:

   (a) Break down total requirements into smaller tasks or quantities, where economically feasible, in order to permit maximum participation by MWBEs and other small businesses.

   (b) Provide interested MWBEs with adequate and timely information about plans, specifications, and requirements of the Contract.

(c) Establish delivery schedules, where the requirements of this contract permit, that encourage participation by MWBEs and other small businesses.

(d) Reduce bonding requirements where practicable.

(e) Utilize the services of available minority community organizations, minority contractor groups, local minority assistance offices, and organizations that provide assistance in the recruitment and placement of MWBEs and other small businesses.

3. The actions described in this section should supplement efforts to provide information to all qualified firms, and nothing in this section is intended to prevent or discourage the Bidders from inviting proposals for participation from non-MWBE firms as well as MWBE firms.

E. NON-DISCRIMINATION

1. Bidders shall not create barriers to open and fair opportunities for all businesses including MWBEs to participate in all State contracts and to obtain or compete for contracts and subcontracts as sources of supplies, equipment, construction and services. In considering offers from and doing business with subcontractors and suppliers, the Bidder shall not discriminate on the basis of race, color, creed, religion, sex, age, nationality, marital status, or the presence of any mental or physical disability in an otherwise qualified disabled person.

F. SANCTIONS

1. Any violation of the mandatory requirements of this part of the contract shall be a material breach of contract for which the Bidder may be subject to a requirement of specific performance, or damages and sanctions provided by contract, by RCW 39.19.090, or by other applicable laws.

12.2 VETERAN-OWNED BUSINESS AND SMALL, MINI, AND MICRO BUISNESS UTILIZATION

The State of Washington encourages participation in all of its contracts by Veteran-owned businesses (defined in RCW 43.60A.010) and located at:

http://www.dva.wa.gov/program/certified-veteran-and-servicemember-owned-businesses and Small, Mini and Micro businesses (defined in RCW 39.26.010) which have registered in WEBS at https://pr-webs-vendor.des.wa.gov/.

1. The following voluntary numerical WDVA and Small Business participation goals have been established for this solicitation:

   WDVA 5% Small Business 5%

2. These goals are voluntary, but achievement of the goals is encouraged. Bidders may search Washington Small Businesses registered in WEBS at:

   https://pr-webs-vendor.des.wa.gov/ and WA Veteran-owned Businesses at https://www.dva.wa.gov/veterans-their-families/veteran-ownedbusinesses/vob-search to obtain information on registered firms.

12.3 SUBCONTRACTOR PARTICIPATION MONITORING AND REPORTING

A. Once a contract is awarded through the solicitation or proposal process, the awarded Prime Contractor is obligated to complete the vendor registration in Access Equity. Access Equity is a secure online vendor management system (B2GNow). Confidential information (Tax ID, etc.) will not be published. Prime Contractors that have previously registered with B2Gnow for any public entity, must verify the system has updated information. Contractors can access the system at:

https://omwbe.diversitycompliance.com/ or through a direct link on the Office of Minority and Women's Business Enterprises (OMWBE) website at: https://omwbe.wa.gov/.

B. Each month during the contract, the Prime Contractor will report payments to ALL Subcontractors through the Access Equity system. This monthly reporting information includes total payment in dollars made to the Subcontractor, payment dates, and any additional information required to verify payment to Subcontractors. The Prime Contractor will enter this payment information into the Access Equity system, and the Subcontractors will verify this payment information in the system. Online training is available through the Access Equity/B2Gnow system. This requirement applies to both Prime Contractors and Subcontractors.

END OF INSTRUCTIONS TO BIDDERS

/ / / / /

Cape Disappointment State Park
Welcome Center and Entrance Improvements
SW-C1124
https://mrscrosters.bonfirehub.com/portal
The Bidder will submit the Bid to State Parks Public Opportunities
MRSC Bonfire Procurement Portal

Bidder Compliance Form

Contractor Information

Person Signing Bid		**Firm Name**	
Title Person Signing		**Physical Address**	
Contractor Registration #		**City, State, ZIP**	
Taxpayer Identification #		**Phone #**	
Washington UBI #		**Cellular Phone #**	
WA ESD #		**Email Address**	

The Bidder Compliance Form verifies compliance with State of Washington Public Works Bid Laws and associated Project Documents. It highlights key project components and ensures acknowledgment. Failure to acknowledge this form within the Bid Form, as directed, will render the bid non-responsive. Acknowledging the form does not alter the bidder's obligation to comply with all contract documents if awarded the project.

Bidder's Declaration

The Bidder declares that they have carefully examined the site of the proposed work, the Drawings, Specifications and all of the conditions affecting the work. Therefore, the Bidder proposes to provide all labor, equipment, materials, and permits and to perform all work as required by, and in strict accordance with the Contract Documents as shown on the bid proposal form.

Bid Acceptance and Agency Discretion

The Agency reserves the right to accept or reject all bids and to waive informalities. The Bidder will allow 60 days from bid opening date for acceptance of its bid by the Agency.

Registration and Required Licenses

The Bidder is a registered contractor in compliance with Chapter 18.27 RCW. If applicable, as the prime contractor, the Bidder self-performing plumbing work holds the required licensure under Chapter 18.106 RCW. Similarly, if self-performing elevator work, the Bidder holds the necessary license in accordance with Chapter 70.87 RCW. Additionally, if the Bidder is self-performing electrical work, they are properly licensed under Chapter 19.28 RCW.

Time for Completion

Bidder agrees to complete project (including accepted alternates) in accordance with drawings and specifications within **120** calendar days from the date provided on the Notice to Proceed letter.

Liquidaded Damages

It is agreed that liquidated damages, in the amount of **$500.00**, shall be levied for each and every calendar day by which the completion of the work is delayed beyond the time fixed for completion or extension of the contract.

Cape Disappointment State Park
Welcome Center and Entrance Improvements
SW-C1124
https://mrscrosters.bonfirehub.com/portal
The Bidder will submit the Bid to State Parks Public Opportunities
MRSC Bonfire Procurement Portal

Bid Form

Unit prices and estimated quantities shall be used to determine the Base Bid

These prices shall also be used to adjust the Contract in the event there is an increase or decrease in the estimated quantities. All costs shall be "in place" costs and complete, **excluding State Sales Tax**. In the event of an irregularity, the unit price prevails. The Agency reserves the right to make mathematical corrections of multiplication or addition errors on the bid form.

Trench Excavation Safety Provisions

If the contract contains any work which requires trenching exceeding a depth of four (4) feet, all costs for adequate trench safety systems shall be identified as a separate bid item in compliance with Chapter 39.04 RCW. The purpose of this provision is to ensure that the bidder agrees to comply with all relevant trench safety requirements of Chapter 49.17 RCW. This bid amount shall be considered part of the total base bid. **Include a lump sum dollar amount (even if the value is $0.00) to be considered responsive to the bid solicitation.**

Wage Certification

The bidder certifies under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct: within the three-year period immediately preceding the bid solicitation date, the bidder has not been a "willful" violator, as defined in RCW 49.48.082, of any provision of chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

Base Bid Items (Be sure to include unit prices)

Item No.	Description	Est Qty	Unit Type	Unit Price	Total Amount
1	Trench Excavation Safety Provisions	1	LS.		$0.00
2	Mobilization, Clean-up, and Demobilization	1	LS.		$0.00
3	Site Improvements	1	LS.		$0.00
4	Welcome Center Building	1	LS.		$0.00
5	Admin/Shop Improvements	1	LS.		$0.00
6	Three Waters Trail - West Side	1	LS.		$0.00
7	Three Waters Trail - East Side	1	LS.		$0.00
				Total Base Bid	**$0.00**

Apprentice Utilization Requirements

Item No.	Description	Est Qty	Unit Type	Unit Price	Total Amount

The apprentice labor hours required for this project are 15% of the total labor hours. The undersigned agrees to utilize this level of apprentice participation. A monetary incentive of $1,000.00 will be paid to the contractor meeting the apprentice utilization requirement. A monetary penalty will be applied to the contractor failing to meet the utilization requirement and failing to demonstrate a Good Faith Effort. The penalty will be $100.00 per percentage point not utilized.

Expected Apprenticeship Utilization cost value to be included in the bid associated with meeting the goals: $

Receipt of Addenda

List all addenda received, separated by commas (e.g., "1, 2, 3, 4"). Do not list only the final number (e.g., "4"). If no addenda, type "N/A." Failure to follow this may render your bid non-responsive.

Bid Acknowledgment and Compliance Certification

By signing and returning this form, you acknowledge compliance with the bid requirements. Failure to sign and submit this form will result in the bid being considered non-responsive.

/s/ Signature of Authorized Official
Typing your name can count as a signature.

Date

Cape Disappointment State Park
Welcome Center and Entrance Improvements
SW-C1124
https://mrscrosters.bonfirehub.com/portal
The Bidder will submit the Bid to State Parks Public Opportunities - MRSC Bonfire Procurement Portal

MWBE, WA Small Business, Veteran-Owned Business Utilization Certification

The bidder certifies good faith efforts to provide opportunities to MWBEs, Small Businesses, and Veteran-Owned Businesses. If awarded, the bidder commits to utilizing these firms or approved substitutes on the project. If no such firms will be used, enter **"N.A." on the first line**.

	Firm Name, Address	Federal I.D. #	Type of Work	Certificate Number	MBE%	WBE%	Small Business%	Veteran Business%
1								
2								
3								
4								
				Totals	0.00%	0.00%	0.00%	0.00%

The bidder may add rows for additional MWBE/WA Small and Veteran-Owned Business Utilization Certifications.

Cape Disappointment State Park
Welcome Center and Entrance Improvements
SW-C1124
https://mrscrosters.bonfirehub.com/portal
The Bidder will submit the Bid to State Parks Public Opportunities
MRSC Bonfire Procurement Portal

Subcontractor Utilization List

Subcontractor Utilization List (If Applicable)

In compliance with the contract documents, the following subcontractor list is submitted:

SUBCONTRACTOR LISTING - RCW 39.30.060

If the base bid and the sum of the additive alternates is **ONE MILLION DOLLARS OR MORE**, the Bidder shall provide names of the subcontractors with whom the Bidder will directly subcontract for performance of the following work. If the Bidder intends to perform the work, the Bidder must enter its name for that category of work.

A. Submission Deadline: **The completed and signed Subcontractors List must be submitted with bid.**

B. List Subcontractors: The Bidder shall indicate on the Subcontractors List the names of the subcontractors with whom the Bidder, if awarded the contract, will directly subcontract for performance of the work of heating, ventilation, and air conditioning, plumbing as described in Chapter 18.106 RCW, electrical as described in Chapter 19.28 RCW, structural steel installation, and rebar installation.

C. List Bidder if Bidder Performing Work: If the Bidder will self-perform the work in any of the five areas required, the Bidder shall name itself for the work on the Subcontractors List.

D. Name Only One Firm for Each Category of Work: The Bidder shall not list more than one firm (subcontractor or Bidder) for each category of work identified, unless subcontractors vary with bid Alternatives or Additives, in which case the Bidder must indicate which firm will be used for which Alternate or Additive.

E. Substitution of Subcontractors: Substitution of any listed subcontractor may only be according to the procedure and parameters set forth in RCW 39.30.060.

F. Factors Relating to Non-Responsiveness: **Failure of the Bidder to submit the names of such subcontractors or to name itself to perform such work or the naming of two or more firms (subcontractors or Bidder) to perform the same work, or failure to sign the form shall render the Bidder's bid non-responsive and, therefore, VOID**.

G. The Subcontractor Utilization List is intended to discourage bid shopping, not to verify subcontractor qualifications. The Agency does not use the Subcontractor Utilization List as a tool to disqualify or qualify bidders.

H. Applicable to Direct Subcontractors: The requirement of this section to name the Bidders' proposed heating, ventilation and air conditioning, plumbing, electrical, structural steel installation, and rebar installation subcontractors applies only to proposed heating, ventilation and air conditioning, plumbing, electrical, structural steel installation, and rebar installation subcontractors who will contract directly with the Bidder.

1 HVAC. Electrical, Plumbing: The requirement of this section to name the bidder's proposed heating, ventilation and air conditioning, plumbing and electrical subcontractors applies only to proposed heating, ventilation, and air conditioning, plumbing and electrical subcontractors who will contract directly with the

Category of Work	Bidder MUST check one box for each Category of Work. If subcontracting the work, bidder must name the subcontractor
HVAC (Heating, Ventilation & Air Conditioning)	☐ Name of Subcontractor: _____ ☐ Bidder will self-perform this work, or the project does not include this work.
Electrical	☐ Name of Subcontractor: _____ ☐ Bidder will self-perform this work, or the project does not include this work.
Plumbing	☐ Name of Subcontractor: _____ ☐ Bidder will self-perform this work, or the project does not include this work.

Bidder may attach a separate sheet for additional alternate bid subcontractors

2 Structural Steel Installation and Rebar Installation: The requirement of this section to name the bidder's proposed names of the subcontractors with whom the bidder, if awarded, will subcontract for performance of the work of structural steel installation and rebar installation.

Category of Work	Bidder MUST check one box for each Category of Work. If subcontracting the work, bidder must name the subcontractor
Structural Steel Installation	☐ Name of Subcontractor: _____ ☐ Bidder will self-perform this work, or the project does not include this work.
Rebar Installation	☐ Name of Subcontractor: _____ ☐ Bidder will self-perform this work, or the project does not include this work.

Bidder may attach a separate sheet for additional alternate bid subcontractors

/s/ Signature of Authorized Official
Typing your name can count as a signature.

Cape Disappointment State Parks
Welcome Center Entrance Improvements
SW-C1124
https://mrscrosters.bonfirehub.com/portal
The Bidder will submit the Bid Bond (if Applicable) to State Parks Public Opportunities
MRSC Bonfire Procurement Portal

Bid Bond Requirements

Bid Guarantee: See Instructions to Bidders 11.1 Bid Bond. No particular bid bond form is required. Failure of the Bidder to provide bid guarantee when required shall render the bid non-responsive.

Bid Bond Threshold

1. A bid bond is not required if the total bid amount, including all additive alternates, is $35,000 or less.
2. For bids exceeding $35,000, a bid bond of 5% of the total bid amount is mandatory.

Acceptable Forms

1. Acceptable forms of bid guarantee: A bid bond, and must be submitted as part of the bid response.
2. Scanned copies of the bid bond (e.g., PDF) are acceptable and should be included with the electronic bid submission

Submission Process

1. Include the bid bond in a single PDF file.
2. At the time of bid, the bidder must upload an electronic copy of the acceptable bid guarantee to the State Parks Oportunities via MRSC Portal Bonfire https://mrscrosters.bonfirehub.com/portal

Retention and Forfeiture

1. Bid bonds for the three lowest bidders will be retained for 30 days or until a contract is executed with the successful bidder.
2. All other bid bonds will be released within 15 days of the bid opening.
3. If the successful bidder fails to execute the contract or provide a performance bond within 15 days of receiving the contract forms, the bid bond may be forfeited as liquidated damages.

Bid Validity Period

1. Bidders must allow for a 60-day acceptance period from the bid opening date.

Important Reminder

1. Review all bid documents thoroughly to ensure compliance with submission requirements, including proper completion and inclusion of the bid bond when applicable.

For further details or clarification, refer to Section 11.1 of the "Instructions to Bidders" in the project manual. If you have questions, contact contracts@parks.wa.gov

☐ **Check the box to the left if the total bid, including all additive alternates, is $35,000 or less**, and include this statement with your bid response. No bid bond is required for bids at or below this amount. For bids exceeding $35,000, a bid bond must be submitted instead. Failure to provide a required bid bond will render the bid non-responsive.

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA
WITH INCLUSION PLAN AND APPRENTICESHIP REQUIREMENTS

Low Responsible Bidder
It is the intent of the Agency to award a contract to the lowest responsive and responsible Bidder. In determining the Bidder's responsibility, the Agency shall consider an overall accounting of the items listed below. Potential Bidders may request the Agency modify the Bidder responsibility criteria. The request must be in writing and submitted at least 7 days prior to the bid opening.

The apparent low bidder shall submit the required information within **two (2)** business days of receiving request from the Agency. This request may be made in the form of a telephone call or email message. The required information shall be provided on the referenced forms bound herein. Electronic copies may be made available upon request. Failure to submit such information to the satisfaction of the Agency within the time provided may render the Bidder as not responsible.

1.1 REQUIRED INFORMATION/CRITERIA

A. For the purposes of the Supplemental Bidder Responsibility evaluation process, the scope of this project generally involves:
- **Construct a new entrance at Cape Disappointment State Park featuring a Welcome Center, expanded admin/shop facilities, improved vehicle and pedestrian circulation, and a new visitor parking lot.**
- **Enhance traffic safety and flow while adding parking for cars, RVs, and trailers, relocating the dumpster, and building a new trail system.**

B. Experience Of Contractor On Projects Of Similar Size And Complexity: Contractor is required to have successfully completed at least **three (3)** projects of similar type, size and complexity to this project, each with a contract amount of at least **$1,000,000.00**, within the last **seven (7)** years.

C. List of Completed Projects (Use Form 1, Contractor Experience Detail): Provide a list of all the construction contracts **$2,500,000.00** and above your firm has completed within the past **five (5)** years, giving the name of the project; name, address, and phone numbers of Owner and architect representatives; final contract amount; date of completion; and percentage of the cost of the work performed with your firm's own forces. This information will be used for reference reviews.

2.1 EXPERIENCE OF KEY PERSONNEL

A. Experience of Project Manager (Use Form 2, Résumé of Key Personnel for Proposed Contract): Submit resume and references for the proposed Project Manager. This person shall have managed, as lead project manager, a minimum of **three (3)** projects of similar type, size and complexity to this project, and successfully completed those projects within the last **ten (10)** years.

B. Experience of Superintendent (Use Form 2, Résumé of Key Personnel for Proposed Contract): Submit resume and references for the proposed project Superintendent. This person shall have performed as the lead Superintendent for a minimum of **three (3)** projects of similar type, size and complexity to this project, and successfully completed those projects within the last **ten (10)** years.

3.1 DIVERSE BUSINESS INCLUSION PLAN (USE FORM 3)

A. Washington state goals are: Minority Business Enterprise (MBE) 10%, Women's Business Enterprise (WBE) 6%, WA Small Business 5% and WA Veterans 5%. The apparent low bidder is required to submit a Diverse Businesses Inclusion Plan for all projects with a Maximum Allowable Construction Cost (MACC) over $1M.

The Diverse Business Inclusion plan shall include the apparent low bidder's anticipated participation goals, the subcontractors anticipated to be used on this project, a list of diverse businesses near the project, the project's diverse expert, and past performance using diverse businesses.

4.1 APPRENTICESHIP (USE FORMS 1 & 4)

A. For each public works project with an apprenticeship utilization goal that was completed by the Bidder within three (3) years of the bid submittal date for this project, the Bidder shall submit the following:

- A list of such projects;
- The owner and contact information for the owner's representative;
- The apprenticeship utilization percentage goal for the project:
- The actual utilization percentage by the Bidder; and
- An explanation of any extenuating circumstances that contributed to the Bidder not meeting the goals.

(Use Form 4 for projects not listed on Form 1)

The Agency may contact previous owners to validate the information provided by the Bidder and shall consider whether the goals were mandatory or voluntary, and the validity of any explanation of extenuating circumstances.

5.1 REFERENCES FROM OWNERS AND ARCHITECTS FOR PREVIOUS PROJECTS (AGENCY USES FORM 5, REFERENCE EVALUATION QUESTIONNAIRE)

A. The Agency may check references by contacting owners and architects of the bidder's previous projects regarding the bidder's performance and that of key staff. A reference score sheet will be utilized and the rating shall be satisfactory or better on a five-category scale with "satisfactory" at mid-scale.

6.1 OVERALL SCORING (FORM 6, RESPONSIBILITY CRITERIA EVALUATION SCORE SHEET)

A. The Agency will use this form to complete and document the overall evaluation process.

END OF SECTION

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

Supplemental Bidder Responsibility
Form 1 - Contractor Experience Detail

Contractor Information:			
Contractor Legal Name:			Contact Person and their Position/Title:
Project Superintendent:			Project Manager:
Physical Address (Physical and Mailing Addresses are the Same ☐) :			Mailing Address:
Telephone:	Cell Phone:	Email Address:	

Project Information: Is this project relevant to the proposed project? Yes ☐ No ☐		
Project:		Location:
Project Description:		As Prime: ☐ As Sub: ☐
Original Contract Amount: $ Final Contract Amount: $		Original Contract Days: Final Contract Days:

Owner Information:		
Owner's Business Name:		Contact Person and their Position/Title:
Mailing Address :		Telephone: Email Address:

Architect/Engineering Information:		
Owner's Business Name:		Contact Person and their Position/Title:
Mailing Address :		Telephone: Email Address:

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS
Supplemental Bidder Responsibility
Form 2 - Resume of Key Personnel

Name:	Role in this Contract:	Years Experience	
		Total	With Current Firm
Firm Name and Location (City and State):			
Training/Education/Specialization:			
Years of Experience in the Proposed Role:			

RELEVANT PROJECTS			
Project Title:			Year Completed
Project Owner:			
Brief Description (Brief scope, size, cost, etc.) and specific role:			Check if project performed with current firm. ☐ If performed with different firm list the firm name
Reference Name & Contact Information:			
Project Owner:		Project Architect:	
Name:		Name:	
Phone:		Phone:	
E-mail		E-mail:	

RELEVANT PROJECTS		
Project Title:		Year Completed
Project Owner:		
Brief Description (Brief scope, size, cost, etc.) and specific role:		Check if project performed with current firm. ☐ If performed with different firm list the firm name
Reference Name & Contact Information:		
Project Owner:	Project Architect:	
Name:	Name:	
Phone:	Phone:	
E-mail	E-mail:	

RELEVANT PROJECTS		
Project Title:		Year Completed
Project Owner:		
Brief Description (Brief scope, size, cost, etc.) and specific role:		Check if project performed with current firm. ☐ If performed with different firm list the firm Name
Reference Name & Contact Information:		
Project Owner:	Project Architect:	
Name:	Name:	
Phone:	Phone:	
E-mail	E-mail:	

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

RELEVANT PROJECTS			
Project Title:			Year Completed
Project Owner:			
Brief Description (Brief scope, size, cost, etc.) and specific role:			Check if project performed with current firm. ☐ If performed with different firm list the firm Name
Reference Name & Contact Information:			
Project Owner:		Project Architect:	
Name:		Name:	
Phone:		Phone:	
E-mail		E-mail:	

RELEVANT PROJECTS			
Project Title:			Year Completed
Project Owner:			
Brief Description (Brief scope, size, cost, etc.) and specific role:			Check if project performed with current firm. ☐ If performed with different firm list the firm Name
Reference Name & Contact Information:			
Project Owner:		Project Architect:	
Name:		Name:	
Phone:		Phone:	
E-mail		E-mail:	

RELEVANT PROJECTS			
Project Title:			Year Completed
Project Owner:			
Brief Description (Brief scope, size, cost, etc.) and specific role:			Check if project performed with current firm. ☐ If performed with different firm list the firm Name
Reference Name & Contact Information:			
Project Owner:		Project Architect:	
Name:		Name:	
Phone:		Phone:	
E-mail		E-mail:	

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

Supplemental Bidder Responsibility
Form 3 - Prime Contractor Diverse Business Inclusion Plan

Prime Contractor Name: _____

For the purposes of this form, Washington State-certified diverse businesses are defined as follows:

- *Minority Business Enterprise (MBE), Women's Business Enterprise (WBE)*, or combination of the two. Certified by the Office of Minority and Women's Business Enterprises (OMWBE): http://omwbe.wa.gov/
- *Veteran-owned Business*. Certified by the Department of Veteran's Affairs (DVA): http://dva.wa.gov/
- *Small Business* (includes Mini and Micro businesses). Certified through the Washington Electronic Business Solution (WEBS): https://fortress.wa.gov/ga/webs/home.html

Anticipated Certified Diverse Business Participation Goals

Subcontracting means direct performance of commercially useful work through subcontracting as part of the proposed project team. Of the total contract work, what are the diverse business participation goals proposed for subcontracting on your team? Please only include the above-listed Washington State certification types in your "Contractor-defined Anticipated Percent of Contract Amount (Goals)" estimate. Zero percent (0%) is not a goal.

Anticipated Certified Diverse Business Participation Goals	Washington State Goals	Contractor-defined Anticipated Percent of Contract Amount (Goals)
Minority-owned business (MBE)	**10%**	**%**
Women-owned business (WBE)	**6%**	**%**
Veteran-owned business (DVA)	**5%**	**%**
Small business	**5%**	**%**

Subcontracting Team

List the names of the diverse businesses you anticipate using on this project. Generally describe the work you expect the diverse business to perform and identify the percent of total contract value intended for each diverse business. Please include the above-listed Washington State certification types. *If necessary, add more rows below.*

Name of Diverse Business	Specify Diverse Business Certification (circle one or more)	Describe Trade or Task	Anticipated Percent of Contract Amount
	MBE, WBE, DVA, Small		%
	MBE, WBE, DVA, Small		%
	MBE, WBE, DVA, Small		%
	MBE, WBE, DVA, Small		%
	MBE, WBE, DVA, Small		%

Attach a list of diverse businesses near the project location to this form:

1. Go to https://omwbe.wa.gov/directory-certified-firms
2. Click on "OMWBE DIRECTORY"
3. Click on "Search Certified Firm Directory"
4. Select MBE, MWBE, SBE, and WBE certifications.
5. Enter a City, Zip Code, or County near the project site address and then press "Search" at the bottom of the page. If you do not have many results, please expand your search to include nearby locations.
6. Print and attach the results to this form with your submittal

Diverse Expert:

Diverse Expert responsibilities would typically include, but are not limited to:

- Outreach to qualified diverse businesses.
- Submit and discuss updates on a regular basis to the state project manager regarding Diverse Business utilization and progress.
- Ongoing outreach to diverse businesses for required contract work, including any changes in scope.
- Assist diverse businesses with successful contract performance.

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

A qualified Diverse Expert brings knowledge of the identity, capabilities and capacities of diverse business subcontractors and suppliers; experience recruiting and working with diverse businesses for construction; and assisting diverse businesses to develop working relationships with contractors.

Identify the person within your team to manage your diverse inclusion responsibility.

Diverse Expert Name:
_____

Diverse Expert Contact Information:
_____

Diverse Expert Firm (if another firm is managing participation):
_____

Past Performance
Please select **five (5) of your projects** with Washington State-certified diverse business participation (MBE, WBE, DVA, and/or Small/Mini/Micro) and list them below **for the last five (5) years**. If you do not have any projects that tracked or reported diverse business participation, you may leave this section blank. In that case, please attach an additional sheet with explanation.

You may have projects with diverse business participation for an organization or entity that required *different* diverse business categories (including self-certification). If so, please attach a sheet with the same column data and information, but include percentages for the categories that were tracked during the project.

Contract Name	Contracting Agency or Entity	Contract Amount	Year	Percent of Contract Amount	
				Minority-owned business:	%
				Women-owned business:	%
				Veteran-owned business:	%
				Small/mini/micro business:	%
Contract Name	**Contracting Agency or Entity**	**Contract Amount**	**Year**	**Percent of Contract Amount**	
		$		Minority-owned business:	%
				Women-owned business:	%
				Veteran-owned business:	%
				Small/mini/micro business:	%
Contract Name	**Contracting Agency or Entity**	**Contract Amount**	**Year**	**Percent of Contract Amount**	
		$		Minority-owned business:	%
				Women-owned business:	%
				Veteran-owned business:	%
				Small/mini/micro business:	%
Contract Name	**Contracting Agency or Entity**	**Contract Amount**	**Year**	**Percent of Contract Amount**	
		$		Minority-owned business:	%
				Women-owned business:	%
				Veteran-owned business:	%
				Small/mini/micro business:	%
Contract Name	**Contracting Agency or Entity**	**Contract Amount**	**Year**	**Percent of Contract Amount**	
		$		Minority-owned business:	%
				Women-owned business:	%
				Veteran-owned business:	%
				Small/mini/micro business:	%

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

Supplemental Bidder Responsibility
Form 4 – Apprenticeship Utilization

Contractor Information:		
Contractor Legal Name:		Contact Person and their Position/Title:
Project Superintendent:		Project Manager:
Physical Address (Physical and Mailing Addresses are the Same ☐) :		Mailing Address:
Telephone: / Cell Phone: / Email Address:		

Project Information: Is this project relevant to the proposed project? Yes ☐ No ☐		
Project:		Location:
Project Description:		As Prime: ☐ As Sub: ☐
Original Contract Amount: $ Final Contract Amount: $		Original Contract Days: Final Contract Days:

Owner Information:		
Owner's Business Name:		Contact Person and their Position/Title:
Mailing Address :		Telephone: Email Address:

Architect/Engineering Information:		
Owner's Business Name:		Contact Person and their Position/Title:
Mailing Address :		Telephone: Email Address:

1. Did this project require Apprenticeship Participation? Yes ☐ No ☐ (If NO, stop here)
2. If yes, what was the Apprenticeship percentage? _____ %
3. What was the actual percentage achieved? _____ %
4. Was the apprenticeship requirement met? Yes ☐ No ☐
5. If NO to question 4, explain Why.

CAPE DISAPPOINTMENT STATE PARK
WELCOME CENTER AND ENTRANCE IMPROVEMENTS

Supplemental Bidder Responsibility
Form 5 - Reference Evaluation Questionnaire

Evaluated Firm :
Project Manager:
Superintendent:
Evaluated Project Name:

☐ Prime
☐ Subcontractor

Approx. Start Date	Approx. End Date	Approx. Final Project Cost

PERFORMANCE EVALUATION

Rating Criteria - Rate on a scale of 1 to 5

- **5** = **Superior** based on performance (would hire this firm/individual again)
- **4** = **More than Satisfactory**
- **3** = **Satisfactory** based on performance (would hire this firm/individual again)
- **2** = **Less than Satisfactory**
- **1**= **Totally Unsatisfactory** based on performance (would never hire the firm/individual again)

	Criteria	Rating		
		Company	PM	Super
1	Ability to meet client's expectations			
2	Quality of workmanship			
3	Ability to manage project costs and minimize change orders			
4	Ability to maintain project schedule			
5	Ability to manage subcontractors			
6	Professionalism, leadership and communication in issues management (RFI, shop drawing submittal, timely resolution of issues/questions)			
7	Ability to follow the owner's rules, regulations, and requirements (housekeeping, safety, etc.)			
8	Ability to manage closeout process (Prompt submittal of punch list, warranty, as-builts, operation manuals, tax clearances, etc.)			
9	Comfort level in hiring firm or individual again based on performance			
	Total Score			
	Average Score			

Evaluator Information

Name of Evaluator: Title:

Firm/Company Name:

Firm Address:

Phone: Email:

Form 6 – Supplemental Responsibility Criteria Evaluation Score Sheet

Project Location _____
Project Name _____
Contract Number _____
Project Representative _____

1. Experience of Contractor - On projects of similar size & complexity (Form 1)	Pass or Fail

2. Experience of Key Personnel (Form 2)	
Superintendent	Pass or Fail
Project Manager	Pass or Fail
Other(s) if specified in Division 00	Pass or Fail

3. Diverse Business Inclusion Plan (Form 3) *(Applies only to projects with Diverse Business Plan Inclusion requirements; i.e. MACC over $1M)*	Pass, Fail, or N/A

4. Contractor Compliance with Apprenticeship Requirements - Requirements were met or if not, a good faith effort was demonstrated (Forms 1 & 4) *Applies only to projects with apprenticeship participation requirements; i.e. MACC over $1M*	Not Scored

5. References from Previous Projects (Form 5) Evaluate contractor's references information and using the rating numbers: 1 = NOT Satisfactory (requires a written comment below) 2 = Less THAN Satisfactory 3 = Satisfactory 4 = More THAN Satisfactory 5 = Superior	Rating **Score 1-5** (3 is Satisfactory)
Company	
Project Manager	
Superintendent	
Total Score:	
Average score (divide total score by number of ratings)	

In determining the bidder responsibility, an overall accounting of the ratings shall be made. A score of "Pass" is required for categories 1 - 4 and an average score of 3.0 or higher is required to meet the minimum Supplemental Bidder Responsibility requirements.

Comments _____

Determination ☐ Responsible
☐ Not Responsible (Preliminary Determination)

Evaluated by _____ Date _____
State Parks Project Representative

_____
Signature

GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

Part		Page
PART 1	GENERAL PROVISIONS	
1.01	Definitions	2
1.02	Order of Precedence	3
1.03	Execution and Intent	4
PART 2	INSURANCE AND BONDS	
2.01	Contractor's Liability Insurance	4
2.02	Coverage Limits	5
2.03	Insurance Coverage Certificates	6
2.04	Payment and Performance Bonds	6
2.05	Alternative Surety	6
2.06	Builder's Risk	6
PART 3	TIME AND SCHEDULE	
3.01	Progress and Completion	7
3.02	Construction Schedule	7
3.03	Owner's Right to Suspend the Work for Convenience	8
3.04	Owner's Right to Stop the Work for Cause	8
3.05	Delay	8
3.06	Notice to Owner of Labor Disputes	9
3.07	Damages for Failure to Achieve Timely Completion	9
PART 4	SPECIFICATIONS, DRAWINGS, AND OTHER DOCUMENTS	
4.01	Discrepancies and Contract Document Review	10
4.02	Project Record	10
4.03	Submittals	10
4.04	Organization of Specifications	11
4.05	Ownership and Use of Drawings, Specifications, and Other Documents	11
PART 5	PERFORMANCE	
5.01	Contractor Control and Supervision	12
5.02	Permits, Fees and Notices	13
5.03	Patents and Royalties	13
5.04	Prevailing Wages	13
5.05	Hours of Labor	14
5.06	Nondiscrimination	14
5.07	Safety Precautions	15
5.08	Operations, Material Handling, and Storage Areas	17
5.09	Prior Notice of Excavation	17
5.10	Unforeseen Physical Conditions	18
5.11	Protection of Existing Structures, Equipment, Vegetation, Utilities, and Improvements	18
5.12	Layout of Work	19
5.13	Material and Equipment	19
5.14	Availability and Use of Utility Services	20
5.15	Tests and Inspection	20
5.16	Correction of Nonconforming Work	21
5.17	Clean Up	22
5.18	Access to Work	22
5.19	Other Contracts	22
5.20	Subcontractors and Suppliers	22
5.21	Warranty of Construction	24
5.22	Indemnification	24
5.23	American with Disabilities Act (ADA) Compliance	24
PART 6	PAYMENTS AND COMPLETION	
6.01	Contract Sum	25
6.02	Schedule of Values	25
6.03	Application for Payment	26
6.04	Progress Payments	26
6.05	Payments Withheld	27
6.06	Retainage and Bond Claim Rights	27
6.07	Substantial Completion	27
6.08	Prior Occupancy	27
6.09	Final Completion, Acceptance, and Payment	28
PART 7	CHANGES	
7.01	Changes in the Work	28
7.02	Change in the Contract Sum	29
7.03	Change in the Contract Time	34
PART 8	CLAIMS AND DISPUTE RESOLUTION	
8.01	Claims Procedure	35
8.02	Arbitration	36
8.03	Claims Audits	37
PART 9	TERMINATION OF THE WORK	
9.01	Termination by Owner for Cause	38
9.02	Termination by Owner for Convenience	39
PART 10	MISCELLANEOUS PROVISIONS	
10.01	Governing Law	39
10.02	Successors and Assigns	39
10.03	Meaning of Words	39
10.04	Rights and Remedies	40
10.05	Contractor Registration	40
10.06	Time Computations	40
10.07	Records Retention	40
10.08	Third-Party Agreements	40
10.09	Antitrust Assignment	40
10.10	Minority & Women's Business Enterprises (MWBE) Participation	40
10.11	Minimum Levels of Apprenticeship Participation	41
10.12	Headings and Captions	42
10.13	Subcontractor Payments Reporting Requirements	42

GENERAL CONDITIONS FOR CONSTRUCTION AT WASHINGTON STATE PARKS

PART 1 - GENERAL PROVISIONS

1.01 DEFINITIONS

A. "Application for Payment" means a written request submitted by Contractor to A/E for payment of Work completed in accordance with the Contract Documents and approved Schedule of Values, supported by such substantiating data as Owner or A/E may require.

B. “Architect,” “Engineer,” or “A/E" shall mean that person designated by the State Parks and Recreation Commission to be in charge of the work covered by this contract.

C. "Change Order" means a written instrument signed by Owner and Contractor stating their agreement upon all of the following: (1) a change in the Work; (2) the amount of the adjustment in the Contract Sum, if any, and (3) the extent of the adjustment in the Contract Time, if any.

D. "Claim" means Contractor's exclusive remedy for resolving disputes with Owner regarding the terms of a Change Order or a request for equitable adjustment, as more fully set forth in part 8.

E. “Contract Award Amount” is the sum of the Base Bid and any accepted Alternates.

F. "Contract Documents" means the Advertisement for Bids, Instructions for Bidders, completed Form of Proposal, General Conditions, Modifications to the General Conditions, Supplemental Conditions, Public Works Contract, other Special Forms, Drawings and Specifications, and all addenda and modifications thereof.

G. "Contract Sum" is the total amount payable by Owner to Contractor for performance of the Work in accordance with the Contract Documents, including all taxes imposed by law and properly chargeable to the Work, except Washington State sales tax.

H. "Contract Time" is the number of calendar days allotted in the Contract Documents for achieving Substantial Completion of the Work.

I. "Contractor" means the person or entity who has agreed with Owner to perform the Work in accordance with the Contract Documents.

J. "Drawings" are the graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, and may include plans, elevations, sections, details, schedules, and diagrams.

K. "Final Acceptance" means the written acceptance issued to Contractor by Owner after Contractor has completed the requirements of the Contract Documents, as more fully set forth in Section 6.09 B.

L. "Final Completion" means that the Work is fully and finally completed in accordance with the Contract Documents, as more fully set forth in Section 6.09 A.

M. "Force Majeure" means those acts entitling Contractor to request an equitable adjustment in the Contract Time, as more fully set forth in paragraph 3.05 A.

N. "Notice" means a written notice which has been delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended or, if delivered or sent by registered or certified mail, to the last business address known to the party giving notice.

O. "Notice to Proceed" means a notice from Owner to Contractor that defines the date on which the Contract Time begins to run.

P. "Owner" shall mean the Washington State Parks and Recreation Commission and its authorized representative with the authority to enter into, administer and/or terminate contracts and make related determinations and findings.

Q. "Person" means a corporation, partnership, business association of any kind, trust, company, or individual.

R. "Prior Occupancy" means Owner's use of all or parts of the Project before Substantial Completion, as more fully set forth in Section 6.08 A.

S. "Progress Schedule" means a schedule of the Work, in a form satisfactory to Owner, as further set forth in section 3.02.

T. "Project" means the total construction of which the Work performed in accordance with the Contract Documents may be the whole or a part and which may include construction by Owner or by separate contractors.

U. "Project Manual" means the volume usually assembled for the Work which may include the bidding requirements, sample forms, and other Contract Documents.

V. "Project Record" means the separate set of Drawings and Specifications as further set forth in paragraph 4.02A.

W. "Schedule of Values" means a written breakdown allocating the total Contract Sum to each principle category of Work, in such detail as requested by Owner.

X. "Specifications" are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards, and workmanship for the Work, and performance of related services.

Y. "Subcontract" means a contract entered into by Subcontractor for the purpose of obtaining supplies, materials, equipment, or services of any kind for or in connection with the Work.

Z. "Subcontractor" means any person, other than Contractor, who agrees to furnish or furnishes any supplies, materials, equipment, or services of any kind in connection with the Work.

AA. "Substantial Completion" means that stage in the progress of the Work where Owner has full and unrestricted use and benefit of the facilities for the purposes intended, as more fully set forth in section 6.07.

AB. "Work" means the construction and services required by the Contract Documents, and includes, but is not limited to, labor, materials, supplies, equipment, services, permits, and the manufacture and fabrication of components, performed, furnished, or provided in accordance with the Contract Documents.

1.02 ORDER OF PRECEDENCE

Any conflict or inconsistency in the Contract Documents shall be resolved by giving the documents precedence in the following order.

1. Signed Public Works Contract, including any Change Orders, and any Special Forms.
2. Supplemental Conditions.
3. General Conditions.
4. Addenda
5. Specifications--provisions in Division 1 shall take precedence over provisions of any other Division.
6. Drawings--in case of conflict within the Drawings, large scale drawings shall take precedence over small scale drawings.
7. Signed and Completed Form of Proposal.
8. Instructions to Bidders.
9. Advertisement for Bids.

1.03 EXECUTION AND INTENT

Contractor makes the following representations to Owner:

1. The Contract Sum is reasonable compensation for the Work and the Contract Time is adequate for the performance of the Work, as represented by the Contract Documents;

2. Contractor has carefully reviewed the Contract Documents, visited and examined the Project site, become familiar with the local conditions in which the Work is to be performed, and satisfied itself as to the nature, location, character, quality and quantity of the Work, the labor, materials, equipment, goods, supplies, work, services and other items to be furnished and all other requirements of the Contract Documents, as well as the surface and subsurface conditions and other matters that may be encountered at the Project site or affect performance of the Work or the cost or difficulty thereof;

3. Contractor is financially solvent, able to pay its debts as they mature, and possesses sufficient working capital to complete the Work and perform Contractor's obligations required by the Contract Documents; and

4. Contractor is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work and perform the obligations required by the Contract Documents and has sufficient experience and competence to do so.

PART 2 - INSURANCE AND BONDS

2.01 CONTRACTOR'S LIABILITY INSURANCE

Prior to commencement of the Work, Contractor shall obtain all the insurance required by the Contract Documents and provide evidence satisfactory to Owner that such insurance has been procured. Review of the Contractor's insurance by Owner shall not relieve or decrease the liability of Contractor. Companies writing the insurance to be obtained by this part shall be licensed to do business under Chapter 48 RCW or comply with the Surplus Lines Law of the State of Washington. Contractor shall include in its bid the cost of all insurance and bond costs required to complete the base bid work and accepted alternates. Insurance carriers providing insurance in accordance with the Contract Documents shall be acceptable to Owner, and its A. M. Best rating shall be indicated on the insurance certificates.

A. Contractor shall maintain the following insurance coverage during the Work and for one year after Final Acceptance. Contractor shall also maintain the following insurance coverage during the performance of any corrective Work required by section 5.16.

    1. Commercial General Liability (CGL) on an Occurrence Form:

        a. Completed operations/products liability;

        b. Explosion, collapse, and underground; and

        c. Employer's liability coverage.

    2. Automobile liability

B. Contractor shall comply with the Washington State Industrial Insurance Act and, if applicable, the Federal Longshoremen's and Harbor Workers' Act and the Jones Act.

C. All insurance coverages shall protect against claims for damages for personal and bodily injury or death, as well as claims for property damage, which may arise from operations in connection with the Work whether such operations are by Contractor or any Subcontractor.

D. All insurance coverages shall be endorsed to include Owner as an additional named insured for Work performed in accordance with the Contract Documents, and all insurance certificates shall evidence the Owner as an additional insured.

2.02 COVERAGE LIMITS INSURANCE COVERAGE CERTIFICATES

A. Insurance Coverage Certificates
The Contractor shall furnish acceptable proof of insurance coverage on the State of Washington Certificate of Insurance form SF500A dated 07/02/92 or an acceptable ACORD form.

B. Required Coverages
1. For a contract less than $100,000.00, the coverage required is:
   a. Public Liability Insurance – The Contractor shall at all times during the term of this contract, at its cost and expense, carry and maintain general public liability insurance, including contractual liability, against claims for bodily injury, personal injury, death or property damage occurring or arising out of services provided under this contract. This insurance shall cover claims caused by any act, omission, or negligence of the Contractor or its officers, agents, representatives, assigns or servants. The limits of liability insurance, which may be increased as deemed necessary by the contracting parties, shall be:

Each Occurrence	$1,000,000.00
General Aggregate Limits (other than products – commercial operations)	$1,000,000.00
Products – Commercial Operations Limit	$1,000,000.00
Personal and Advertising Injury Limit	$1,000,000.00
Fire Damage Limit (any one fire)	$50,000.00
Medical Expense Limit (any one person)	$5,000.00

   b. If the contract is for underground utility work, then the Contractor shall provide proof of insurance for that above in the form of Explosion, Collapse and Underground (XCU) coverage.

   c. Employers Liability on an occurrence basis in an amount not less than $1,000,000.00 per occurrence.

2. For contracts over $100,000.00 but less than $5,000,000.00 the contractor shall obtain the coverage limits as listed for contracts below $100,000.00 and General Aggregate and Products – Commercial Operations Limit of not less than $2,000,000.00.

3. Coverage for Comprehensive General Bodily Injury Liability Insurance for a contract over $5,000,000.00 is:

Each Occurrence	$2,500,000.00
General Aggregate Limits (other than products – commercial operations)	$5,000,000.00
Products – Commercial Operations limit	$5,000,000.00
Personal and Advertising Injury Limit	$2,500,000.00
Fire Damage Limit (any one fire)	$50,000.00
Medical Expense Limit (any one Person)	$5,000.00

4. For all Contracts – Automobile Liability: in the event that services delivered pursuant to this contract involve the use of vehicles or the transportation of clients, automobile liability insurance shall be required. If Contractor-owned personal vehicles are used, a Business Automobile Policy covering at a minimum Code 2 “owned autos only” must be secured. If Contractor employee’s vehicles are used, the Contractor must also include under the Business Automobile Policy Code 9, coverage for non-owned autos. The minimum limits for automobile liability is: $1,000,000.00 per occurrence, using a combined single limit for bodily injury and property damage.

5. For Contracts for Hazardous Substance Removal (Asbestos Abatement, PCB Abatement, etc.)
   a. In addition to providing insurance coverage for the project as outlined above, the Contractor shall provide Environmental Impairment Liability insurance for the hazardous substance removal as follows:

EACH OCCURRENCE	AGGREGATE
$500,000.00	$1,000,000.00

   or $1,000,000.00 each occurrence/aggregate bodily injury and property damage combined single limit.

1) Insurance certificate must state that the insurer is covering hazardous substance removal.
2) Should this insurance be secured on a “claims made” basis, the coverage must be continuously maintained for one year following the project’s “final completion” through official completion of the project, plus one year following.

For Contracts where hazardous substance removal is a subcomponent of contracted work, the general contractor shall provide to the Owner a certificate of insurance for coverage as defined in 5a. above. The State of Washington must be listed as an additional insured. This certificate of insurance must be provided to the Owner prior to commencing work.

2.03 INSURANCE COVERAGE CERTIFICATES

A. Prior to commencement of the Work, Contractor shall furnish to Owner a completed certificate of insurance coverage.

B. All insurance certificates shall name Owner's Project number and Project title.

C. All insurance certificates shall specifically require 45 (forty-five) days prior notice to Owner of cancellation or any material change, except 30 (thirty) days for surplus line insurance.

2.04 PAYMENT AND PERFORMANCE BONDS

AIA Payment and Performance Bonds, form A312, or equivalent, is required by the Owner for the work of this contract. The forms shall be obtained from the Contractor’s bonding company. The Payment Bond shall cover payment to laborers and mechanics, including payments to Employee Benefit Funds, and payments to subcontractors, material suppliers, and persons who shall supply such person or persons, or subcontractors with materials and supplies.

2.05 ALTERNATIVE SURETY

Contractor shall promptly furnish alternative security required to protect Owner and persons supplying labor or materials required by the Contract Documents if:

A. Owner has a reasonable objection to the surety; or

B. Any surety fails to furnish reports on its financial condition if requested by Owner.

2.06 BUILDER'S RISK

A. Contractor shall purchase and maintain property insurance in the amount of the Contract Sum including all Change Orders for the Work on a replacement cost basis until Substantial Completion. The insurance shall cover the interest of Owner, Contractor, and any Subcontractors, as their interests may appear. For projects not involving New Building Construction, ‘Installation Floater’ is an acceptable substitute for the Builder’s Risk Insurance.

B. Contractor property insurance shall be placed on an "all risk" basis and insure against the perils of fire and extended coverage and physical loss or damage including theft, vandalism, malicious mischief, collapse, false work, temporary buildings, debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for A/E's services and expenses required as a result of an insured loss.

C. Owner and Contractor waive all subrogation rights against each other, any Subcontractors, A/E, A/E's subconsultants, separate contractors described in section 5.20, if any, and any of their subcontractors, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this section or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by Owner as fiduciary. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

PART 3 - TIME AND SCHEDULE

3.01 PROGRESS AND COMPLETION

A. Contractor shall diligently prosecute the Work, with adequate forces, achieve Substantial Completion within the Contract Time, and achieve Final Completion within 30 (thirty) calendar days thereafter, unless otherwise noted in Division 1 of the specifications.

B. The Contractor shall notify the Engineer at least two (2) weekdays in advance if work is to be performed on a Saturday, Sunday, or legal holiday. No excavation work will be allowed on Saturdays, Sundays, or legal holidays unless specifically authorized by the Engineer.

3.02 CONSTRUCTION SCHEDULE

A. Unless otherwise provided in Division 1, Contractor shall, within 14 (fourteen) calendar days after issuance of the Notice to Proceed, submit a preliminary Progress Schedule. The Progress Schedule shall show the sequence in which Contractor proposes to perform the Work, and the dates on which Contractor plans to start and finish major portions of the Work, including dates for shop drawings and other submittals, and for acquiring materials and equipment.

B. The Progress Schedule shall be in the form of a Critical Path Method (CPM) logic network or, with the approval of the Owner, a bar chart schedule may be submitted. The scheduling of construction is the responsibility of the Contractor and is included in the contract to assure adequate planning and execution of the work. The schedule will be used to evaluate progress of the work for payment based on the Schedule of Values. The schedule shall show the Contractor's planned order and interdependence of activities, and sequence of work. As a minimum the schedule shall include:

1. Date of Notice to Proceed;
2. Activities (resources, durations, individual responsible for activity, early starts, late starts, early finishes, late finishes, etc.);
3. Utility Shutdowns;
4. Interrelationships and dependence of activities;
5. Planned vs. actual status for each activity;
6. Substantial completion;
7. Punch list;
8. Final inspection;
9. Final completion, and
10. Float time

The Schedule Duration shall be based on the Contract Time of Completion listed on the Bid Proposal form. The Owner shall not be obligated to accept any Early Completion Schedule suggested by the Contractor. The Contract Time for Completion shall establish the Schedule Completion Date.

If the Contractor feels that the work can be completed in less than the Specified Contract Time, then the Surplus Time shall be considered Project Float. This Float time shall be shown on the Project Schedule. It shall be available to accommodate changes in the work and unforeseen conditions.

Neither the Contractor nor the Owner have exclusive right to this Float Time. It belongs to the project.

C. Owner shall return comments on the preliminary Progress Schedule to Contractor within 14 (fourteen) days of receipt. Review by Owner of Contractor's schedule does not constitute an approval or acceptance of Contractor's construction means, methods, or sequencing, or its ability to complete the Work within the Contract Time. Contractor shall revise and resubmit its schedule, as necessary. Owner may withhold a portion of progress payments until a Progress Schedule has been submitted which meets the requirements of this section.

D. Contractor shall utilize and comply with the Progress Schedule. On a monthly basis, or as otherwise directed by Owner, Contractor shall submit an updated Progress Schedule at its own expense to Owner indicating actual progress. If, in the opinion of Owner, Contractor is not in conformance with the Progress Schedule for reasons other than acts of Force Majeure as identified in section 3.05, Contractor shall take

such steps as are necessary to bring the actual completion dates of its work activities into conformance with the Progress Schedule, or revise the Progress Schedule to reconcile with the actual progress of the Work.

E. Contractor shall promptly notify Owner in writing of any actual or anticipated event which is delaying or could delay achievement of any milestone or performance of any critical path activity of the Work. Contractor shall indicate the expected duration of the delay, the anticipated effect of the delay on the Progress Schedule, and the action being or to be taken to correct the problem. Provision of such notice does not relieve Contractor of its obligation to complete the Work within the Contract Time.

3.03 OWNER'S RIGHT TO SUSPEND THE WORK FOR CONVENIENCE

A. Owner may, at its sole discretion, order Contractor, in writing, to suspend all or any part of the Work for up to 90 (ninety) days, or for such longer period as mutually agreed.

B. Upon receipt of a written notice suspending the Work, Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of cost of performance directly attributable to such suspension. Within a period up to 90 (ninety) days after the notice is delivered to Contractor, or within any extension of that period to which the parties shall have agreed, Owner shall either:

1. Cancel the written notice suspending the Work; or

2. Terminate the Work covered by the notice as provided in the termination provisions as more fully set forth in Part 9.

C. If a written notice suspending the Work is cancelled or the period of the notice or any extension thereof expires, Contractor shall resume Work.

D. Contractor shall be entitled to an equitable adjustment in the Contract Time, or Contract Sum, or both, for increases in the time or cost of performance directly attributable to such suspension, provided Contractor complies with all requirements set forth in Part 7.

3.04 OWNER'S RIGHT TO STOP THE WORK FOR CAUSE

A. If Contractor fails or refuses to perform its obligations in accordance with the Contract Documents, Owner may order Contractor, in writing, to stop the Work, or any portion thereof, until satisfactory corrective action has been taken.

B. Contractor shall not be entitled to an equitable adjustment in the Contract Time or Contract Sum for any increased cost or time of performance attributable to Contractor's failure or refusal to perform or from any reasonable remedial action taken by Owner based upon such failure.

3.05 DELAY

A. Any delay in or failure of performance by Owner or Contractor, other than the payment of money, shall not constitute a default hereunder if and to the extent the cause for such delay or failure of performance was unforeseeable and beyond the control of the party ("Force Majeure"). Acts of Force Majeure include, but are not limited to:

1. Acts of God or the public enemy;

2. Acts or omissions of any government entity;

3. Fire or other casualty for which Contractor is not responsible;

4. Quarantine or epidemic;

5. Strike or defensive lockout;

6. Unusually severe weather, in excess of weather conditions which could not have been reasonably anticipated; and

7. Unusual delay in receipt of supplies or products which were ordered and expedited and for which no substitute reasonably acceptable to Owner was available.

B. Contractor shall be entitled to an equitable adjustment in the Contract Time for changes in the time of performance directly attributable to an act of Force Majeure, provided it makes a request for equitable adjustment according to section 7.03. Contractor shall not be entitled to an adjustment in the Contract Sum resulting from an act of Force Majeure.

C. Contractor shall be entitled to an equitable adjustment in Contract Time, and may be entitled to an equitable adjustment in Contract Sum, if the cost or time of Contractor's performance is changed due to the fault or negligence of Owner, provided the Contractor makes a request according to sections 7.02 and 7.03.

D. Contractor shall not be entitled to an adjustment in Contract Time or in the Contract Sum for any delay or failure of performance to the extent such delay or failure was caused by Contractor or anyone for whose acts Contractor is responsible.

E. To the extent any delay or failure of performance was concurrently caused by the Owner and Contractor, Contractor shall be entitled to an adjustment in the Contract Time for that portion of the delay or failure of performance that was concurrently caused, provided it makes a request for equitable adjustment according to section 7.03, but shall not be entitled to an adjustment in Contract Sum.

F. Contractor shall make all reasonable efforts to prevent and mitigate the effects of any delay, whether occasioned by an act of Force Majeure or otherwise.

G. The Owner has acquired ownership and/or easement of lands for the construction, as indicated on the drawings, without cost to the Contractor. The Contractor understands and agrees that, should it appear at any time that the Owner has not acquired title to all of the right-of-ways and lands necessary for the performance of the work under the provisions of this contract, and that if any delay in the performance of said work occasioned by the failure of the Owner, its officers, or employees to acquire a title of any of said lands or right-of-way, such failure shall extend the contract completion date the number of days equal to the period of such delay. The Contractor waives any and all claims for damages against the Owner which the Contractor may sustain by reason of this delay in the work.

3.06 NOTICE TO OWNER OF LABOR DISPUTES

A. If Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay timely performance in accordance with the Contract Documents, Contractor shall immediately give notice, including all relevant information, to Owner.

B. Contractor agrees to insert a provision in its Subcontracts and to require insertion in all sub-subcontracts, that in the event timely performance of any such contract is delayed or threatened by delay by any actual or potential labor dispute, the Subcontractor or Sub-subcontractor shall immediately notify the next higher tier Subcontractor or Contractor, as the case may be, of all relevant information concerning the dispute.

3.07 DAMAGES FOR FAILURE TO ACHIEVE TIMELY COMPLETION

A. Liquidated Damages

1. Timely performance and completion of the Work is essential to Owner and time limits stated in the Contract Documents are of the essence. Owner will incur serious and substantial damages if Substantial Completion of the Work does not occur within the Contract Time. However, it would be difficult if not impossible to determine the exact amount of such damages. Consequently, provisions for liquidated damages are included in the Contract Documents.

2. The liquidated damage amounts set forth in the Contract Documents will be assessed not as a penalty, but as liquidated damages for breach of the Contract Documents. This amount is fixed and agreed upon by and between the Contractor and Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain. This amount shall be construed as the actual amount of damages sustained by the Owner, and may be retained by the Owner and deducted from periodic payments to the Contractor.

3. Assessment of liquidated damages shall not release Contractor from any further obligations or liabilities pursuant to the Contract Documents.

B. Actual Damages

Actual damages will be assessed for failure to achieve Final Completion within the time provided. Actual damages will be calculated on the basis of direct architectural, administrative, and other related costs attributable to the Project from the date when Final Completion should have been achieved, based on the date Substantial Completion is actually achieved, to the date Final Completion is actually achieved. Owner may offset these costs against any payment due Contractor.

PART 4 - SPECIFICATIONS, DRAWINGS, AND OTHER DOCUMENTS

4.01 DISCREPANCIES AND CONTRACT DOCUMENT REVIEW

A. The intent of the Specifications and Drawings is to describe a complete Project to be constructed in accordance with the Contract Documents. Contractor shall furnish all labor, materials, equipment, tools, transportation, permits, and supplies, and perform the Work required in accordance with the Drawings, Specifications, and other provisions of the Contract Documents.

B. The Contract Documents are complementary. What is required by one part of the Contract Documents shall be binding as if required by all. Anything mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, shall be of like effect as if shown or mentioned in both.

C. Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by Owner. If, during the performance of the Work, Contractor finds a conflict, error, inconsistency, or omission in the Contract Documents, it shall promptly and before proceeding with the Work affected thereby, report such conflict, error, inconsistency, or omission to A/E in writing.

D. Contractor shall do no Work without applicable Drawings, Specifications, or written modifications, or Shop Drawings where required, unless instructed to do so in writing by Owner. If Contractor performs any construction activity, and it knows or reasonably should have known that any of the Contract Documents contain a conflict, error, inconsistency, or omission, Contractor shall be responsible for the performance and shall bear the cost for its correction.

E. Contractor shall provide any work or materials the provision of which is clearly implied and is within the scope of the Contract Documents even if the Contract Documents do not mention them specifically.

F. Questions regarding interpretation of the requirements of the Contract Documents shall be referred to the A/E.

4.02 PROJECT RECORD

A. Contractor shall legibly mark in ink on a separate set of the Drawings and Specifications all actual construction, including depths of foundations, horizontal and vertical locations of internal and underground utilities and appurtenances referenced to permanent visible and accessible surface improvements, field changes of dimensions and details, actual suppliers, manufacturers and trade names, models of installed equipment, and Change Order Proposals (COP). This separate set of Drawings and Specifications shall be the "Project Record."

B. The Project Record shall be maintained on the project site throughout the construction and shall be clearly labeled "PROJECT RECORD". The Project Record shall be updated at least weekly noting all changes and shall be available to Owner at all times.

C. Contractor shall submit the completed and finalized Project Record to A/E prior to Final Acceptance.

4.03 SUBMITTALS

A. "Submittals" means documents and other information required to be submitted to A/E by Contractor pursuant to the Contract Documents, showing in detail: the proposed fabrication and assembly of structural

elements; and the installation (i.e. form, fit, and attachment details) of materials and equipment. Submittals include, but are not limited to, drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, samples, and similar materials furnished by Contractor to explain in detail specific portions of the Work required by the Contract Documents. For materials and equipment to be incorporated into the Work, Contractor submittal shall include the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the item. When directed, Contractor shall submit all samples at its own expense. Owner may duplicate, use, and disclose Submittals provided in accordance with the Contract Documents.

B. Contractor shall coordinate all Shop Drawings, and review them for accuracy, completeness, and compliance with the Contract Documents and shall indicate its approval thereon as evidence of such coordination and review. Where required by law, Shop Drawings shall be stamped by an appropriate professional licensed by the state of Washington. Shop Drawings submitted to A/E without evidence of Contractor's approval shall be returned for resubmission. Contractor shall review, approve, and submit Shop Drawings with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of Owner or separate contractors. Contractor's submittal schedule shall allow a reasonable time for A/E review. A/E will review, approve, or take other appropriate action on the Shop Drawings. Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings until the respective submittal has been reviewed and the A/E has approved or taken other appropriate action. Owner and A/E shall respond to Shop Drawing submittals with reasonable promptness. Any Work by Contractor shall be in accordance with reviewed Shop Drawings. Submittals made by Contractor which are not required by the Contract Documents may be returned without action.

C. Approval, or other appropriate action with regard to Submittals, by Owner or A/E shall not relieve Contractor of responsibility for any errors or omissions in such Submittals, nor from responsibility for compliance with the requirements of the Contract Documents. Unless specified in the Contract Documents, review by Owner or A/E shall not constitute an approval of the safety precautions employed by Contractor during construction, or constitute an approval of Contractor's means or methods of construction. If Contractor fails to obtain approval before installation and the item or work is subsequently rejected, Contractor shall be responsible for all costs of correction.

D. If Shop Drawings show variations from the requirements of the Contract Documents, Contractor shall describe such variations in writing, separate from the Shop Drawings, at the time it submits the Shop Drawings containing such variations. If A/E approves any such variation, an appropriate Change Order will be issued. If the variation is minor and does not involve an adjustment in the Contract Sum or Contract Time, a Change Order need not be issued; however, the modification shall be recorded upon the Project Record.

E. Unless otherwise provided in Division I, Contractor shall submit to A/E for approval 5 (five) copies of all Submittals. Unless otherwise indicated, 3 (three) sets of all Submittals shall be retained by A/E and 2 (two) sets shall be returned to Contractor.

4.04 ORGANIZATION OF SPECIFICATIONS

Specifications are prepared in sections which conform generally with trade practices. These sections are for Owner and Contractor convenience and shall not control Contractor in dividing the Work among the Subcontractors or in establishing the extent of the Work to be performed by any trade.

4.05 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS, AND OTHER DOCUMENTS

A. The Drawings, Specifications, and other documents prepared by A/E are instruments of A/E's service through which the Work to be executed by Contractor is described. Neither Contractor nor any Subcontractor shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by A/E, and A/E shall be deemed the author of them and will, along with any rights of Owner, retain all common law, statutory, and other reserved rights, in addition to the copyright. All copies of these documents, except Contractor's set, shall be returned or suitably accounted for to A/E, on request, upon completion of the Work.

B. The Drawings, Specifications, and other documents prepared by the A/E, and copies thereof furnished to Contractor, are for use solely with respect to this Project. They are not to be used by Contractor or any

Subcontractor on other projects or for additions to this Project outside the scope of the Work without the specific written consent of Owner and A/E. Contractor and Subcontractors are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications, and other documents prepared by A/E appropriate to and for use in the execution of their Work.

C. Contractor and all Subcontractors grant a non-exclusive license to Owner, without additional cost or royalty, to use for its own purposes (including reproduction) all Shop Drawings, together with the information and diagrams contained therein, prepared by Contractor or any Subcontractor. In providing Shop Drawings, Contractor and all Subcontractors warrant that they have authority to grant to Owner a license to use the Shop Drawings, and that such license is not in violation of any copyright or other intellectual property right. Contractor agrees to defend and indemnify Owner pursuant to the indemnity provisions in section 5.03 and 5.23 from any violations of copyright or other intellectual property rights arising out of Owner's use of the Shop Drawings hereunder, or to secure for Owner, at Contractor's own cost, licenses in conformity with this section.

D. The Shop Drawings and other submittals prepared by Contractor, Subcontractors of any tier, or its or their equipment or material suppliers, and copies thereof furnished to Contractor, are for use solely with respect to this Project. They are not to be used by Contractor or any Subcontractor of any tier, or material or equipment supplier, on other projects or for additions to this Project outside the scope of the Work without the specific written consent of Owner. The Contractor, Subcontractors of any tier, and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Shop Drawings and other submittals appropriate to and for use in the execution of their Work under the Contract Documents.

PART 5 - PERFORMANCE

5.01 CONTRACTOR CONTROL AND SUPERVISION

A. Contractor shall supervise and direct the Work, using its best skill and attention, and shall perform the Work in a skillful manner. Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work, unless the Contract Documents give other specific instructions concerning these matters. Contractor shall disclose its means and methods of construction when requested by Owner.

B. Performance of the Work shall be directly supervised by a competent superintendent who is satisfactory to Owner and has authority to act for Contractor. The superintendent shall not be changed without the prior written consent of Owner. Owner may require Contractor to remove the superintendent from the Work or Project site, if Owner reasonably deems the superintendent incompetent, careless, or otherwise objectionable, provided Owner has first notified Contractor in writing and allowed a reasonable period for transition. The superintendent shall be on-site at all times while the Work is being performed, unless approved in writing by owner, in advance.

C. Contractor shall be responsible to Owner for acts and omissions of Contractor, Subcontractors, and their employees and agents.

D. Contractor shall enforce strict discipline and good order among Contractor's employees and other persons performing the Work. Contractor shall not permit employment of persons not skilled in tasks assigned to them. Contractor's employees shall at all times conduct business in a manner which assures fair, equal, and nondiscriminatory treatment of all persons. Owner may, by written notice, request Contractor to remove from the Work or Project site any employee Owner reasonably deems incompetent, careless, or otherwise objectionable.

E. Contractor shall, at all times, keep on the Project site a copy of the Drawings, Specifications, addenda, reviewed Shop Drawings, permits, and permit drawings.

F. Contractor shall ensure that its owner(s) and employees, and those of its Subcontractors, comply with the Ethics in Public Service Act RCW 42.52, which, among other things, prohibits state employees from having an economic interest in any public works contract that was made by, or supervised by, that employee. Contractor shall remove, at its sole cost and expense, any of its, or its Subcontractors', employees, if they are in violation of this act.

5.02 PERMITS, FEES, AND NOTICES

A. The Owner has obtained a Shorelines Substantial Development Permit and/or other environmental permits as required for this project. The permits with provisions which affect the construction methods or schedule have been incorporated into these specifications. The Contractor shall abide by all restrictions noted in these permits as the construction is in progress.

B. All other permits or fees required by local, state or federal governmental agencies necessary for the construction of this project shall be obtained and paid by the Contractor. Only the cost for the building permit will be reimbursed by the Owner.

C. The Contractor shall conform to all local, State and National Codes in all phases of this project. Where conflicts arise between plans, specifications and code requirements, the code shall prevail unless the plans or specifications are more stringent.

5.03 PATENTS AND ROYALTIES

Contractor is responsible for, and shall pay, all royalties and license fees. Contractor shall defend, indemnify, and hold Owner harmless from any costs, expenses, and liabilities arising out of the infringement by Contractor of any patent, copyright, or other intellectual property right used in the Work; however, provided that Contractor gives prompt notice, Contractor shall not be responsible for such defense or indemnity when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents. If Contractor has reason to believe that use of the required design, process, or product constitutes an infringement of a patent or copyright, it shall promptly notify Owner of such potential infringement.

5.04 PREVAILING WAGES

A. Contractor and all subcontractors shall pay the prevailing rate of wages to all workers, laborers, or mechanics employed in the performance of any part of the Work in accordance with RCW 39.12 and the rules and regulations of the Department of Labor and Industries. The schedule of prevailing wage rates for the locality or localities of the Work is determined by the Industrial Statistician of the Department of Labor and Industries. It is the Contractor's responsibility to verify the applicable prevailing wage rate.

B. Before payment is made by the Owner to the Contractor for any work performed by the Contractor and subcontractors whose work is included in the application for payment, the Contractor shall submit, or shall have previously submitted to the Owner for the Project, a Statement of Intent to Pay Prevailing Wages, approved by the Department of Labor and Industries, certifying the rate of hourly wage paid and to be paid each classification of laborers, workers, or mechanics employed upon the Work by Contractor and Subcontractors. Such rates of hourly wage shall not be less than the prevailing wage rate.

C. Prior to release of retainage, the Contractor shall submit to the Owner an Affidavit of Wages Paid, approved by the Department of Labor and Industries, for the Contractor and every subcontractor, of any tier, that performed work on the Project.

D. Disputes regarding prevailing wage rates shall be referred for arbitration to the Director of the Department of Labor and Industries. The arbitration decision shall be final and conclusive and binding on all parties involved in the dispute as provided for by RCW 39.12.060.

E. Each Application for Payment submitted by Contractor shall state that prevailing wages have been paid in accordance with the prefiled statement(s) of intent, as approved. Copies of the approved intent statement(s) shall be posted on the job site with the address and telephone number of the Industrial Statistician of the Department of Labor and Industries where a complaint or inquiry concerning prevailing wages may be made.

F. In compliance with chapter 296-127 WAC, Contractor shall pay to the Department of Labor and Industries the currently established fee(s) for each statement of intent and/or affidavit of wages paid submitted to the Department of Labor and Industries for certification.

G. Copies of approved Intents to Pay Prevailing Wages for the Contractor and all subcontractors shall be submitted with the Contractor's first application for payment. As additional subcontractors perform work on

the project, their approved Intent forms shall be submitted with the Contractor's next application for payment.

H. The Contractor or subcontractor directly contracting for "Off-Site, Prefabricated, Non-Standard, Project Specific Items" shall identify and report information required on the affidavit of wages paid form filed with the Department of Labor and Industries. The Contractor shall include language in its subcontracts requiring subcontractors and lower-tier subcontractors to comply with the reporting requirements for "Off-Site, Prefabricated, Non-Standard, Project Specific Item(s)" on the affidavit of wages paid.

The reporting requirement for Items shall apply for all public works contracts estimated to cost over $1 million entered into by the Owner and Contractor between September 1, 2010 and December 31, 2013.

"Off-site, prefabricated, nonstandard, project specific item(s)" means products or items that are:

1. Made primarily of architectural or structural precast concrete, fabricated steel, pipe and pipe systems, or sheet metal and sheet metal duct work;
2. Produced specifically for the public work and not considered to be regularly available shelf items;
3. Produced or manufactured by labor expended to assemble or modify standard items; and
4. Produced at an off-site location outside Washington.

The Contractor or subcontractor shall comply with the reporting requirements and instructions on the affidavit of wages paid form, and shall report the following information on the affidavit of wages paid form submitted to the Department of Labor and Industries in order to comply with the reporting requirements for use of "Off-Site, Prefabricated, Non-Standard, Project Specific item(s)":

1. The estimated cost of the public works project;
2. The name of the awarding agency and the project title;
3. The contract value of the off-site, prefabricated, nonstandard, project specific item(s) produced outside of Washington State, including labor and materials; and
4. The name, address, and federal employer identification number of the contractor that produced the off-site, prefabricated, nonstandard, project specific item(s).

The owner may direct the contractor, at no additional cost to the owner, to remove and substitute any subcontractor(s) found to be out of compliance with the "Off-Site Prefabricated Non-Standard Project Specific Item(s)" reporting requirements more than one time as determined by the Department of Labor and Industries.

I. The Contractor and all subcontractors shall promptly submit to the Owner certified payroll copies if requested.

5.05 HOURS OF LABOR

A. Contractor shall comply with all applicable provisions of RCW 49.28 and they are incorporated herein by reference. Pursuant to that statute, no laborer, worker, or mechanic employed by Contractor, any Subcontractor, or any other person performing or contracting to do the whole or any part of the Work, shall be permitted or required to work more than eight (8) hours in any one calendar day, provided, that in cases of extraordinary emergency, such as danger to life or property, the hours of work may be extended, but in such cases the rate of pay for time employed in excess of eight (8) hours of each calendar day shall be not less than one and one-half times (x1.5) the rate allowed for this same amount of time during eight (8) hours service.

B. Notwithstanding the preceding paragraph, RCW 49.28 permits a contractor or subcontractor in any public works contract subject to those provisions, to enter into an agreement with its employees in which the employees work up to ten (10) hours in a calendar day. No such agreement may provide that the employees work ten-hour days for more than four (4) calendar days a week. Any such agreement is subject to approval by the employees. The overtime provisions of RCW 49.28 shall not apply to the hours, up to forty (40) hours per week, worked pursuant to any such agreement.

5.06 NONDISCRIMINATION

A. Discrimination in all phases of employment is prohibited by, among other laws and regulations, Title VII of the Civil Rights Act of 1964, the Vietnam Era Veterans Readjustment Act of 1974, sections 503 and 504 of the Vocational Rehabilitation Act of 1973, the Equal Employment Act of 1972, the Age Discrimination Act of

1967, the Americans with Disabilities Act of 1990, the Civil Rights Act of 1991, Presidential Executive Order 11246, Executive Order 11375, the Washington State Law Against Discrimination, RCW 49.60, and Gubernatorial Executive Order 85-09. These laws and regulations establish minimum requirements for affirmative action and fair employment practices which Contractor must meet.

B. During performance of the Work:

1. Contractor shall not discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, age, marital status, or the presence of any physical, sensory, or mental disability, Vietnam era veteran status, or disabled veteran status, nor commit any other unfair practices as defined in RCW 49.60.

2. Contractor shall, in all solicitations or advertisements for employees placed by or for it, state that the contractor is an “equal opportunity employer”.

3. Contractor shall send to each labor union, employment agency, or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice advising the labor union, employment agency, or workers' representative of Contractor's obligations according to the Contract Documents and RCW 49.60.

4. Contractor shall permit access to its books, records, and accounts, and to its premises by Owner, and by the Washington State Human Rights Commission, for the purpose of investigation to ascertain compliance with this section of the Contract Documents.

5. Contractor shall include the provisions of this section in every Subcontract.

C. Nondiscrimination Requirement. During the term of this Contract, Contractor, including any subcontractor, shall not discriminate on the bases enumerated at RCW 49.60.530(3). In addition, Contractor, including any subcontractor, shall give written notice of this nondiscrimination requirement to any labor organizations with which Contractor, or subcontractor, has a collective bargaining or other agreement.

D. Obligation to Cooperate. Contractor, including any subcontractor, shall cooperate and comply with any Washington state agency investigation regarding any allegation that Contractor, including any subcontractor, has engaged in discrimination prohibited by this Contract pursuant to RCW 49.60.530(3).

E. Default. Notwithstanding any provision to the contrary, Owner may suspend Contractor, including any subcontractor, upon notice of a failure to participate and cooperate with any state agency investigation into alleged discrimination prohibited by this Contract, pursuant to RCW 49.60.530(3). Any such suspension will remain in place until Owner receives notification that Contractor, including any subcontractor, is cooperating with the investigating state agency. In the event Contractor, or subcontractor, is determined to have engaged in discrimination identified at RCW 49.60.530(3), Owner may terminate this Contract in whole or in part, and Contractor, subcontractor, or both, may be referred for debarment as provided in RCW 39.26.200. Contractor or subcontractor may be given a reasonable time in which to cure this noncompliance, including implementing conditions consistent with any court-ordered injunctive relief or settlement agreement.

F. Remedies for Breach. Notwithstanding any provision to the contrary, in the event of Contract termination or suspension for engaging in discrimination, Contractor, subcontractor, or both, shall be liable for contract damages as authorized by law including, but not limited to, any cost difference between the original contract and the replacement or cover contract and all administrative costs directly related to the replacement contract, which damages are distinct from any penalties imposed under Chapter 49.60, RCW. Owner shall have the right to deduct from any monies due to Contractor or subcontractor, or that thereafter become due, an amount for damages Contractor or subcontractor will owe Owner for default under this provision.

5.07 SAFETY PRECAUTIONS

A. In performing this contract, the Contractor shall provide for protecting the lives and health of employees and other persons; preventing damage to property, materials, supplies, and equipment; and avoid work interruptions. For these purposes, the Contractor shall:

1. Follow Washington Industrial Safety and Health Act (WISHA) regional directives and provide a site-specific safety program that will require an accident prevention and hazard analysis plan for the contractor and each subcontractor on the work site. The Contractor shall submit a site-specific safety plan to the Owner's representative prior to the initial scheduled construction meeting.

2. Provide adequate safety devices and measures including, but not limited to, the appropriate safety literature, notice, training, permits, placement and use of barricades, signs, signal lights, ladders, scaffolding, staging, runways, hoist, construction elevators, shoring, temporary lighting, grounded outlets, wiring, hazardous materials, vehicles, construction processes, and equipment required by Chapter 19.27 RCW, State Building Code (International Building, Electrical, Mechanical, Fire, and Uniform Plumbing Codes); Chapter 212-12 WAC, Fire Marshal Standards, Chapter 49.17 RCW, WISHA; Chapter 296-155 WAC, Safety Standards for Construction Work; Chapter 296-65 WAC; WISHA Asbestos Standard; WAC 296-62-071, Respirator Standard; WAC 296-62, General Occupation Health Standards, WAC 296-24, General Safety and Health Standards, WAC 296-24, General Safety and Health Standards, Chapter 49.70 RCW, and Right to Know Act.

3. Comply with the State Environmental Policy Act (SEPA), Clean Air Act, Shoreline Management Act, and other applicable federal, state, and local statutes and regulations dealing with the prevention of environmental pollution and the preservation of public natural resources.

4. Post all permits, notices, and/or approvals in a conspicuous location at the construction site.

5. Provide any additional measures that the Owner determines to be reasonable and necessary for ensuring a safe environment in areas open to the public. Nothing in this part shall be construed as imposing a duty upon the Owner or A/E to prescribe safety conditions relating to employees, public, or agents of the Contractors.

6. The Contractor shall make available a list of hazardous products being used on the project, and their respective Material Safety Data Sheets (MSDS) to the Engineer. This information will be required at the pre-construction conference.

B. In carrying out its responsibilities according to the Contract Documents, Contractor shall protect the lives and health of employees performing the Work and other persons who may be affected by the Work; prevent damage to materials, supplies, and equipment whether on site or stored off-site; and prevent damage to other property at the site or adjacent thereto. Contractor shall comply with all applicable laws, ordinances, rules, regulations, and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss; shall erect and maintain all necessary safeguards for such safety and protection; and shall notify owners of adjacent property and utilities when prosecution of the Work may affect them.

C. Contractor shall maintain an accurate record of exposure data on all incidents relating to the Work resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment. Contractor shall immediately report any such incident to Owner. Owner shall, at all times, have a right of access to all records of exposure.

D. Contractor shall provide all persons working on the Project site with information and training on hazardous chemicals in their work at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

1. Information. At a minimum, Contractor shall inform persons working on the Project site of:

   a. The requirements of chapter 296-62 WAC, General Occupational Health Standards;
   b. Any operations in their work area where hazardous chemicals are present; and
   c. The location and availability of written hazard communication programs, including the required list(s) of hazardous chemicals and material safety data sheets required by chapter 296-62 WAC.

2. Training. At a minimum, Contractor shall provide training for persons working on the Project site which includes:

a. Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
b. The physical and health hazards of the chemicals in the work area;
c. The measures such persons can take to protect themselves from these hazards, including specific procedures Contractor, or its Subcontractors, or others have implemented to protect those on the Project site from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and
d. The details of the hazard communications program developed by Contractor, or its Subcontractors, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

E. Contractor's responsibility for hazardous, toxic, or harmful substances shall include the following duties:

1. Contractor shall not keep, use, dispose, transport, generate, or sell on or about the Project site, any substances now or hereafter designated as, or which are subject to regulation as, hazardous, toxic, dangerous, or harmful by any federal, state or local law, regulation, statute or ordinance (hereinafter collectively referred to as "hazardous substances", in violation of any such law, regulation, statute, or ordinance, but in no case shall any such hazardous substance be stored more than 90 days on the Project site.

2. Contractor shall promptly notify Owner of all spills or releases of any hazardous substances which are otherwise required to be reported to any regulatory agency and pay the cost of cleanup. Contractor shall promptly notify Owner of all failures to comply with any federal, state, or local law, regulation, or ordinance; all inspections of the Project site by any regulatory entity concerning the same; all regulatory orders or fines; and all responses or interim cleanup actions taken by or proposed to be taken by any government entity or private party on the Project site.

F. All Work shall be performed with due regard for the safety of the public. Contractor shall perform the Work so as to cause a minimum of interruption of vehicular traffic or inconvenience to pedestrians. All arrangements to care for such traffic shall be Contractor's responsibilities. All expenses involved in the maintenance of traffic by way of detours shall be borne by Contractor.

G. In an emergency affecting the safety of life or the Work or of adjoining property, Contractor is permitted to act, at its discretion, to prevent such threatened loss or injury, and Contractor shall so act if so authorized or instructed.

H. Nothing provided in this section shall be construed as imposing any duty upon Owner or A/E with regard to, or as constituting any express or implied assumption of control or responsibility over, Project site safety, or over any other safety conditions relating to employees or agents of Contractor or any of its Subcontractors, or the public.

5.08 OPERATIONS, MATERIAL HANDLING, AND STORAGE AREAS

A. Contractor shall confine all operations, including storage of materials, to Owner-approved areas.

B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be provided by Contractor only with the consent of Owner and without expense to Owner. The temporary buildings and utilities shall remain the property of Contractor and shall be removed by Contractor at its expense upon completion of the Work.

C. Contractor shall use only established roadways or temporary roadways authorized by Owner. When materials are transported in prosecuting the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by federal, state, or local law or regulation.

D. Ownership and control of all materials or facility components to be demolished or removed from the Project site by Contractor shall immediately vest in Contractor upon severance of the component from the facility or severance of the material from the Project site. Contractor shall be responsible for compliance with all

laws governing the storage and ultimate disposal. Contractor shall provide Owner with a copy of all manifests and receipts evidencing proper disposal when required by Owner or applicable law.

E. Contractor shall be responsible for the proper care and protection of its materials and equipment delivered to the Project site. Materials and equipment may be stored on the premises subject to approval of Owner. When Contractor uses any portion of the Project site as a shop, Contractor shall be responsible for any repairs, patching, or cleaning arising from such use.

F. Contractor shall protect and be responsible for any damage or loss to the Work, or to the materials or equipment until the date of Substantial Completion, and shall repair or replace without cost to Owner any damage or loss that may occur, except damages or loss caused by the acts or omissions of Owner. Contractor shall also protect and be responsible for any damage or loss to the Work, or to the materials or equipment, after the date of Substantial Completion, and shall repair or replace without cost to Owner any such damage or loss that might occur, to the extent such damages or loss are caused by the acts or omissions of Contractor, or any Subcontractor.

G. Any removed item shall be salvaged without undue damage and stockpiled in a neat and orderly fashion in an area designated by the Engineer. All removed items shall remain the property of the Owner, unless, due to their condition, they are rejected by the Engineer. All materials of whatever nature that are rejected shall be properly disposed by the Contractor in compliance with all laws and regulations.

H. If designated campsites or emergency overflow areas are approved for use, the Contractor shall comply with all campground rules and regulations of the Washington State Parks and Recreation Commission and the park manager.

5.09 PRIOR NOTICE OF EXCAVATION

A. "Excavation" means an operation in which earth, rock, or other material on or below the ground is moved or otherwise displaced by any means, except the tilling of soil less than 12 (twelve) inches in depth for agricultural purposes, or road ditch maintenance that does not change the original road grade or ditch flow line. Before commencing any excavation, Contractor shall provide notice of the scheduled commencement of excavation to all owners of underground facilities or utilities, through locator services.

5.10 UNFORESEEN PHYSICAL CONDITIONS

A. If Contractor encounters conditions at the site which are subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then Contractor shall give written notice to Owner promptly and in no event later than 7 (seven) days after the first observance of the conditions. Conditions shall not be disturbed prior to such notice.

B. If such conditions differ materially and cause a change in Contractor's cost of, or time required for, performance of any part of the Work, the Contractor may be entitled to an equitable adjustment in the Contract Time or Contract Sum, or both, provided it makes a request therefore as provided in part 7.

5.11 PROTECTION OF EXISTING STRUCTURES, EQUIPMENT, VEGETATION, UTILITIES, AND IMPROVEMENTS

A. Contractor shall protect from damage all existing structures, equipment, improvements, utilities, and vegetation: at or near the Project site; and on adjacent property of a third party, the locations of which are made known to or should be known by Contractor. Contractor shall repair any damage, including that to the property of a third party, resulting from failure to comply with the requirements of the Contract Documents or failure to exercise reasonable care in performing the Work. If Contractor fails or refuses to repair the damage promptly, Owner may have the necessary work performed and charge the cost to Contractor.

B. Contractor shall only remove trees when specifically authorized to do so, and shall protect vegetation that will remain in place.

C. In general, the locations of existing major utilities and equipment, whether above ground or underground, are indicated on the drawings. This information has been obtained from utility maps and verbal

descriptions. The Engineer does not guarantee the accuracy or completeness of this information. Other above ground or underground facilities not shown on the drawings may be encountered during the course of the work for which the Contractor is fully responsible to properly locate and identify within the construction area.

D. Existing above ground and underground facilities and appurtenant structures, which includes but is not limited to, power transmission and distribution, telephone, alarm systems, sanitary sewers, gas services, water service and house or yard drains and fences, shall be located, protected, maintained, relocated, rerouted, removed and restored as may be necessary by the Contractor for completion of the work, but in a manner satisfactory to their respective owners and operators of the services and to the Engineer with the least possible interruption to existing services.

E. The Contractor shall be responsible for location and maintenance of existing utilities and improvements. Under no circumstances will errors or omissions in location of utilities or improvements, whether they be visible from the surface, buried, or otherwise obscured, be considered as a basis for a claim for additional compensation by the Contractor.

F. All utilities shall be protected and maintained in continuous operation except where special arrangements have been made with the appropriate utility owner. All damaged utilities shall be restored to original condition, subject to the approval of its owner and at the Contractor's own expense.

G. If requested, the Contractor shall provide record information about locations, depths, and dimensions of lines, appurtenances, and structures, and any other relevant information about electrical power, water, sewer, and other utilities.

H. The Contractor shall provide the Engineer with the data required to make a detailed set of record plans. This data will be obtained and recorded by the Contractor during construction on plans supplied by the Engineer. The Contractor shall ensure that the data is obtained. Typical information to be gathered includes the locations of:

1. Buried utilities
2. Junctions of sewer wyes
3. Junctions of electrical taps
4. Clean-outs
5. Deflection points of utilities
6. Valves

I. Procedure for obtaining this information will be developed by the Engineer working with the Contractor.

J. Contractor shall protect all existing facilities using whatever methods are necessary, subject to the Engineer's approval. Trees, shrubs, vegetation, or lawn shall not be damaged, scarred, or destroyed unless deemed necessary for work on this contract. All trees damaged during construction shall be immediately repaired using SEAL AND HEAL or other materials as directed by the Engineer. Any damage to the above-mentioned items shall be repaired at the Contractor's expense and to the Engineer's satisfaction.

K. In the event that archaeological resources are found or unearthed on public land during the performance of this contract, the Contractor shall be required to comply with RCW 27.44 and RCW 27.53 and the rules and regulations of the office of Archaeology and Historic Preservation, including compliance with all archaeological excavation permit requirements.

5.12 LAYOUT OF WORK

A. Contractor shall plan and lay out the Work in advance of operations so as to coordinate all work without delay or revision.

B. Contractor shall lay out the Work from Owner-established baselines and bench marks indicated on the Drawings, and shall be responsible for all field measurements in connection with the layout. Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the Work. Contractor shall be responsible for executing the Work to the lines

and grades that may be established. Contractor shall be responsible for maintaining or restoring all stakes and other marks established.

C. The indicated limits of work shall be the controlling factor in the Contractor's scope of operation and no payment shall be due for work done out of the limits. Damage to areas not in the Contractor's work area shall be repaired at the Contractor's expense. Questions of what constitutes the work area shall be determined by the Engineer. Only the best methods of construction will be allowed.

D. The Engineer may adjust or relocate any portion of the system to meet site requirements or to improve the system without additional compensation to the Contractor, provided such adjustments do not represent appreciable costs for additional labor and materials.

5.13 MATERIAL AND EQUIPMENT

A. All equipment, material, and articles incorporated into the Work shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in the Contract Documents. References in the Specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard quality and shall not be construed as limiting competition. Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of A/E, is equal to that named in the specifications, unless otherwise specifically provided in the Contract Documents.

B. Contractor shall do all cutting, fitting, or patching that may be required to make its several parts fit together properly, or receive or be received by work of others set forth in, or reasonably implied by, the Contract Documents. Contractor shall not endanger any work by cutting, excavating, or otherwise altering the Work and shall not cut or alter the work of any other contractor unless approved in advance by Owner.

C. Should any of the Work be found defective, or in any way not in accordance with the Contract Documents, this work, in whatever stage of completion, may be rejected by Owner.

D. The Contractor shall furnish proof of equality in all respects to the specified items when proposing alternate brands or materials. Any significant deviations from specifications, drawings, or equality must be noted by the Contractor when submitting alternate products or materials for approval. The Engineer shall be the sole judge of the equality and suitability of any products, materials, or components proposed by the Contractor as alternates to specified items. The Contractor shall bear all costs and make all secondary changes required to incorporate an approved substitute or alternate into the work. No offers for substitution will be acknowledged from suppliers, distributors, manufacturers, or subcontractors.

5.14 AVAILABILITY AND USE OF UTILITY SERVICES

A. Owner shall make all reasonable utilities available to Contractor from existing outlets and supplies, as specified in the Contract Documents. Unless otherwise provided in the Contract Documents, the utility service consumed shall be charged to or paid for by Contractor at prevailing rates charged to Owner or, where the utility is produced by Owner, at reasonable rates determined by Owner. Contractor will carefully conserve any utilities furnished.

B. Contractor shall, at its expense and in a skillful manner satisfactory to Owner, install and maintain all necessary temporary connections and distribution lines, together with appropriate protective devices, and all meters required to measure the amount of each utility used for the purpose of determining charges. Prior to the date of Final Acceptance, Contractor shall remove all temporary connections, distribution lines, meters, and associated equipment and materials.

5.15 TESTS AND INSPECTION

A. Contractor shall maintain an adequate testing and inspection program and perform such tests and inspections as are necessary or required to ensure that the Work conforms to the requirements of the Contract Documents. Contractor shall be responsible for inspection and quality surveillance of all its Work and all Work performed by any Subcontractor. Unless otherwise provided, Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. Contractor shall give Owner timely notice of when and where tests and

inspections are to be made. Contractor shall maintain complete inspection records and make them available to Owner.

B. Owner may, at any reasonable time, conduct such inspections and tests as it deems necessary to ensure that the Work is in accordance with the Contract Documents. Owner shall promptly notify Contractor if an inspection or test reveals that the Work is not in accordance with the Contract Documents. Unless the subject items are expressly accepted by Owner, such Owner inspection and tests are for the sole benefit of Owner and do not:

1. Constitute or imply acceptance;
2. Relieve Contractor of responsibility for providing adequate quality control measures;
3. Relieve Contractor of responsibility for risk of loss or damage to the Work, materials, or equipment;
4. Relieve Contractor of its responsibility to comply with the requirements of the Contract Documents; or
5. Impair Owner's right to reject defective or nonconforming items, or to avail itself of any other remedy to which it may be entitled.

C. Neither observations by an inspector retained by Owner, the presence or absence of such inspector on the site, nor inspections, tests, or approvals by others, shall relieve Contractor from any requirement of the Contract Documents, nor is any such inspector authorized to change any term or condition of the Contract Documents.

D. Contractor shall promptly furnish, without additional charge, all facilities, labor, material and equipment reasonably needed for performing such safe and convenient inspections and tests as may be required by Owner. Owner may charge Contractor any additional cost of inspection or testing when Work is not ready at the time specified by Contractor for inspection or testing, or when prior rejection makes re-inspection or retest necessary. Owner shall perform its inspections and tests in a manner that will cause no undue delay in the Work.

E. The Owner shall have the right to appoint an Inspector who will have the authority to reject materials or workmanship which does not fulfill the requirements of these specifications. In case of dispute, the Contractor may appeal to the Engineer whose decision shall be final. The acceptance of any material by the Inspector shall not hinder its subsequent rejection if found defective. Rejected materials and workmanship shall be replaced promptly or be made good by the Contractor without additional cost to the Owner.

F. Contractor shall deliver one (1) key for each type of lock installed on the project to the Engineer to enable the Engineer to enter all facilities under construction for the purpose of inspection. This includes temporary as well as State Parks' key-coded locks. All keys for key-coded locks shall be delivered to the Engineer as they are made available to the Contractor. These coded keys shall then be signed out to the Contractor on an accountable basis for security purposes.

5.16 CORRECTION OF NONCONFORMING WORK

A. If a portion of the Work is covered contrary to the requirements in the Contract Documents, it must, if required in writing by Owner, be uncovered for Owner's observation and be replaced at the Contractor's expense and without change in the Contract Time.

B. If, at any time prior to Final Completion, Owner desires to examine the Work, or any portion of it, which has been covered, Owner may request to see such Work and it shall be uncovered by Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an adjustment in the Contract Sum for the costs of uncovering and replacement, and, if completion of the Work is thereby delayed, an adjustment in the Contract Time, provided it makes a request therefore as provided in part 7. If such Work is not in accordance with the Contract Documents, the Contractor shall pay the costs of examination and reconstruction.

C. Contractor shall promptly correct Work found by Owner not to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor shall bear all costs of correcting such nonconforming Work, including additional testing and inspections.

D. If, within one year after the date of Substantial Completion of the Work or designated portion thereof, or within one year after the date for commencement of any system warranties established under section 6.08, or within the terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, Contractor shall correct it promptly after receipt of written notice from Owner to do so. Owner shall give such notice promptly after discovery of the condition. This period of one year shall be extended, with respect to portions of Work first performed after Substantial Completion, by the period of time between Substantial Completion and the actual performance of the Work. Contractor's duty to correct with respect to Work repaired or replaced shall run for one year from the date of repair or replacement. Obligations under this paragraph shall survive Final Acceptance.

E. Contractor shall remove from the Project site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by Contractor nor accepted by Owner.

F. If Contractor fails to correct nonconforming Work within a reasonable time after written notice to do so, Owner may replace, correct, or remove the nonconforming Work and charge the cost thereof to the Contractor.

G. Contractor shall bear the cost of correcting destroyed or damaged Work, whether completed or partially completed, caused by Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

H. Nothing contained in this section shall be construed to establish a period of limitation with respect to other obligations which Contractor might have according to the Contract Documents. Establishment of the time period of one (1) year as described in paragraph 5.16D relates only to the specific obligation of Contractor to correct the Work, and has no relationship to the time within which the Contractor's obligation to comply with the Contract Documents may be sought to be enforced, including the time within which such proceedings may be commenced.

I. If Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, Owner may do so instead of requiring its removal and correction, in which case the Contract Sum may be reduced as appropriate and equitable.

5.17 CLEAN UP

Contractor shall at all times keep the Project site, including hauling routes, infrastructures, utilities, and storage areas, free from accumulations of waste materials. Before completing the Work, Contractor shall remove from the premises its rubbish, tools, scaffolding, equipment, and materials. Upon completing the Work, Contractor shall leave the Project site in a clean, neat, and orderly condition satisfactory to Owner. If Contractor fails to clean up as provided herein, and after reasonable notice from Owner, Owner may do so and the cost thereof shall be charged to Contractor.

5.18 ACCESS TO WORK

Contractor shall provide Owner and A/E access to the Work in progress wherever located.

5.19 OTHER CONTRACTS

Owner may undertake or award other contracts for additional work at or near the Project site. Contractor shall reasonably cooperate with the other contractors and with Owner's employees and shall carefully adapt scheduling and perform the Work in accordance with these Contract Documents to reasonably accommodate the other work.

5.20 SUBCONTRACTORS AND SUPPLIERS

A. The Contractor shall include the language of this paragraph in each of its first tier subcontracts, and shall require each of its subcontractors to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. Upon request of the Owner, the Contractor shall promptly provide documentation to the Owner demonstrating that the subcontractor meets the subcontractor responsibility criteria below. The requirements of this paragraph apply to all subcontractors regardless of tier. At the time of subcontract execution, the Contractor shall verify that each of its first tier subcontractors meets the following bidder responsibility criteria:

1. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal;
2. Have a current Washington Unified Business Identifier (UBI) number;
3. If applicable, have:

    a. Industrial Insurance (workers' compensation) coverage for the subcontractor's employees working in Washington, as required in Title 51 RCW;
    b. A Washington Employment Security Department number, as required in Title 50 RCW;
    c. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
    d. An electrical contractor license, if required by Chapter 19.28 RCW;
    e. An elevator contractor license, if required by Chapter 70.87 RCW.

4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065 (3).
5. On a project subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington state apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW for the one-year period immediately preceding the date of the Owner's first advertisement of the project.

B. Prior to submitting the first Application for Payment, Contractor shall furnish in writing to Owner, on Owner provided form(s), the names, addresses, telephone numbers, and Tax Identification Numbers (TIN) of all subcontractors, as well as suppliers providing materials in excess of $2,500.00 which Contractor believes to be MBE or WBE owned businesses, or have identified themselves to the Contractor as MBE or WBE, or are Washington State OMWBE certified. The Contractor shall indicate the anticipated dollar value of each MWBE subcontract. Contractor shall utilize subcontractors and suppliers, which are experienced and qualified, and meet the requirements of the Contract Documents, if any. Contractor shall not utilize any subcontractor or supplier to whom the Owner has a reasonable objection, and shall obtain Owner's written consent before making any substitutions or additions. The Owner may direct the Contractor, at no additional cost to the Owner, to remove and substitute any subcontractor(s) found to be out of compliance with the "Off-Site Prefabricated Non-Standard Project Specific Items" reporting requirements more than one time as determined by the Department of Labor and Industries and as defined in EHB 2805 that amends RCW 39.04.

C. All Subcontracts must be in writing. By appropriate written agreement, Contractor shall require each Subcontractor, so far as applicable to the Work to be performed by the Subcontractor, to be bound to Contractor by terms of the Contract Documents, and to assume toward Contractor all the obligations and responsibilities which Contractor assumes toward Owner in accordance with the Contract Documents. Each Subcontract shall preserve and protect the rights of Owner in accordance with the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights. Where appropriate, Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. However, nothing in this paragraph shall be construed to alter the contractual relations between Contractor and its Subcontractors with respect to insurance or bonds.

D. Contractor shall schedule, supervise, and coordinate the operations of all Subcontractors. No Subcontracting of any of the Work shall relieve Contractor from its responsibility for the performance of the Work in accordance with the Contract Documents or any other obligations of the Contract Documents.

E. Each subcontract agreement for a portion of the Work is hereby assigned by Contractor to Owner provided that:

1. The assignment is effective only after termination by Owner for cause pursuant to section 9.01 and only for those Subcontracts which Owner accepts by notifying the Subcontractor in writing; and

2. After the assignment is effective, Owner will assume all future duties and obligations toward the Subcontractor which Contractor assumed in the Subcontract.

3. The assignment is subject to the prior rights of the surety, if any, obligated under any bond provided in accordance with the Contract Documents.

5.21 WARRANTY OF CONSTRUCTION

A. In addition to any special warranties provided elsewhere in the Contract Documents, Contractor warrants that all Work conforms to the requirements of the Contract Documents and is free of any defect in equipment, material, or design furnished, or workmanship performed, by Contractor.

B. With respect to all warranties, express or implied, for Work performed or materials furnished according to the Contract Documents, Contractor shall:

1. Obtain all warranties that would be given in normal commercial practice;
2. Require all warranties to be executed, in writing, for the benefit of Owner;
3. Enforce all warranties for the benefit of Owner, if directed by Owner; and
4. Be responsible to enforce any subcontractor's, manufacturer's, or supplier's warranty should they extend beyond the period specified in the Contract Documents.

C. The obligations under this section shall survive Final Acceptance.

5.22 INDEMNIFICATION

A. Contractor shall defend, indemnify, and hold Owner and A/E harmless from and against all claims, demands, losses, damages, or costs, including but not limited to damages arising out of bodily injury or death to persons and damage to property, caused by or resulting from:

1. The sole negligence of Contractor or any of its Subcontractors;
2. The concurrent negligence of Contractor, or any Subcontractor, but only to the extent of the negligence of Contractor or such Subcontractor; and
3. The use of any design, process, or equipment which constitutes an infringement of any United States patent presently issued, or violates any other proprietary interest, including copyright, trademark, and trade secret.

B. In any action against Owner and any other entity indemnified in accordance with this section, by any employee of Contractor, its Subcontractors, Sub-subcontractors, agents, or anyone directly or indirectly employed by any of them, the indemnification obligation of this section shall not be limited by a limit on the amount or type of damages, compensation, or benefits payable by or for Contractor or any Subcontractor under RCW Title 51, the Industrial Insurance Act, or any other employee benefit acts. In addition, Contractor waives immunity as to Owner and A/E only, in accordance with RCW Title 51.

5.23 AMERICANS WITH DISABILITIES ACT (ADA) COMPLIANCE

A. General Requirements
The Contractor and subcontractor shall ensure that all work performed under this Contract complies with the Americans with Disabilities Act (ADA), as codified in 28 C.F.R. § 35.151, and the 2010 ADA Standards for Accessible Design. The Contractor and subcontractor shall construct and maintain all accessible features in operable condition and correct any identified deficiencies in a timely manner.

B. Accessibility in New Construction and Alterations
1. All new facilities and alterations to existing facilities shall be designed and constructed in a manner that ensures accessibility and usability for individuals with disabilities, consistent with ADA accessibility standards.
2. Alterations shall, to the maximum extent feasible, ensure the altered area and the associated path of travel comply with accessibility requirements.
3. If technical infeasibility prevents full compliance, the Contractor and subcontractor shall notify the Owner’s Representative and submit a written request for determination of technical infeasibility.

4. The Contractor and subcontractor shall coordinate with the Owner to ensure that all public notices related to temporary accessibility interruptions are posted on the project site and on designated agency communication channels.

C. Maintenance and Inspection of Accessible Features
1. The Contractor and subcontractor shall be responsible for maintaining accessible routes, parking, restrooms, and other accessible features in operable condition throughout the duration of the Work.
2. Any temporary disruptions affecting accessibility shall be scheduled in a manner that minimizes impact and includes reasonable alternative accommodations where feasible.
3. The Contractor and subcontractor shall notify the Owner immediately if any accessibility feature is found to be non-compliant or requires repair.

D. Historic Structures
If the Work involves historic structures or landscapes that are listed or eligible for listing in the National Register of Historic Places, modifications shall be made in compliance with ADA requirements to the maximum extent feasible. The State Historic Preservation Officer (SHPO) must approve any exemptions for alterations that may impact the historic significance of a structure or landscape.

E. Compliance and Documentation
1. The Contractor and subcontractor shall comply with all applicable local, state, and federal accessibility requirements.
2. Any non-compliant work shall be corrected at the Contractor's expense prior to final acceptance.

F. Submission of Progress Reports – Americans with Disabilities Act (ADA) Compliance
The Contractor shall submit regular progress reports to the Owner, which shall include the following:

1. Status of Accessible Features – Updates on the construction, installation, and maintenance of all accessibility-related features in accordance with ADA standards.
2. Compliance Issues – Identification of any non-compliance issues encountered, including deviations from ADA accessibility standards, technical infeasibility determinations, or unforeseen site conditions affecting accessibility.
3. Corrective Actions – Description of corrective actions taken or proposed to address any identified accessibility deficiencies, including timelines for remediation and any required approvals from the Owner.
4. Temporary Disruptions – Notification of any planned or unplanned interruptions to accessibility features, including measures taken to minimize impacts and alternative accommodations provided.
5. Final Verification – Prior to Substantial Completion, the Contractor shall provide documentation verifying that all constructed and altered elements comply with applicable ADA requirements, subject to inspection and approval by the Owner.

Failure to comply with the provisions of this section may result in suspension of the Work, withholding of payment or other remedies as deemed necessary by the Owner.

PART 6 - PAYMENTS AND COMPLETION

6.01 CONTRACT SUM

Owner shall pay Contractor the Contract Sum for performance of the Work, in accordance with the Contract Documents. The Contract Sum shall include all taxes imposed by law and properly chargeable to the Project, including sales tax.

6.02 SCHEDULE OF VALUES

Before submitting its first Application for Payment, Contractor shall submit to Owner for approval a breakdown allocating the total Contract Sum to each principle category of work, in such detail as requested by Owner ("Schedule of Values"). The approved Schedule of Values shall include appropriate amounts for demobilization, record drawings, O&M manuals, and any other requirements for Project closeout, and shall be used by Owner as the basis for progress payments. Payment for Work shall be made only for and in accordance with those items included in the Schedule of Values.

6.03 APPLICATION FOR PAYMENT

A. At monthly intervals, unless determined otherwise by Owner, Contractor shall submit to Owner an itemized Application for Payment for Work completed in accordance with the Contract Documents and the approved Schedule of Values. Each application shall be supported by such substantiating data as Owner may require.

B. By submitting an Application for Payment, Contractor is certifying that all Subcontractors have been paid, less earned retainage in accordance with RCW 60.28.010, as their interests appeared in the last preceding certificate of payment. By submitting an Application for Payment, Contractor is recertifying that the representations set forth in section 1.03 are true and correct, to the best of Contractor's knowledge, as of the date of the Application for Payment.

C. At the time it submits an Application for Payment, Contractor shall analyze and reconcile, to the satisfaction of Owner, the actual progress of the Work with the Progress Schedule.

D. If authorized by Owner, the Application for Payment may include request for payment for material delivered to the Project site and suitably stored, or for completed preparatory work. Payment may similarly be requested for material stored off the Project site, provided Contractor complies with or furnishes satisfactory evidence of the following:

1. The material will be placed in a warehouse that is structurally sound, dry, lighted, and suitable for the materials to be stored;

2. The warehouse is located within a 10-mile radius of the Project. Other locations may be utilized, if approved in writing, by Owner;

3. Only materials for the Project are stored within the warehouse (or a secure portion of a warehouse set aside for the Project);

4. Contractor furnishes Owner a certificate of insurance extending Contractor's insurance coverage for damage, fire, and theft to cover the full value of all materials stored, or in transit;

5. The warehouse (or secure portion thereof) is continuously under lock and key, and only Contractor's authorized personnel shall have access;

6. Owner shall at all times have the right of access in company of Contractor;

7. Contractor and its surety assume total responsibility for the stored materials; and

8. Contractor furnishes to Owner certified lists of materials stored, bills of lading, invoices, and other information as may be required, and shall also furnish notice to Owner when materials are moved from storage to the Project site.

6.04 PROGRESS PAYMENTS

A. Owner shall make progress payments, in such amounts as Owner determines are properly due, within 30 days after receipt of a properly executed Application for Payment. Owner shall notify Contractor in accordance with RCW 39.76 if the Application for Payment does not comply with the requirements of the Contract Documents.

B. Owner shall retain 5% (five percent) of the amount of each progress payment until forty-five (45) days after Final Acceptance and receipt of all documents required by law or the Contract Documents, including, at Owner's request, consent of surety to release of the retainage. In accordance with RCW 60.28, Contractor may request that monies reserved be retained in a fund by Owner, deposited by Owner in a bank or savings and loan, or placed in escrow with a bank or trust company to be converted into bonds and securities to be held in escrow with interest to be paid to Contractor. Owner may permit Contractor to provide an appropriate bond in lieu of the retained funds.

C. Title to all Work and materials covered by a progress payment shall pass to Owner at the time of such payment free and clear of all liens, claims, security interests, and encumbrances. Passage of title shall not,

however, relieve Contractor from any of its duties and responsibilities for the Work or materials, or waive any rights of Owner to insist on full compliance by Contractor with the Contract Documents.

D. Payments due and unpaid in accordance with the Contract Documents shall bear interest as specified in RCW 39.76.

6.05 PAYMENTS WITHHELD

A. Owner may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any payment to such extent as may be necessary to protect Owner from loss or damage for reasons including but not limited to:

1. Work not in accordance with the Contract Documents;
2. Reasonable evidence that the Work required by the Contract Documents cannot be completed for the unpaid balance of the Contract Sum;
3. Work by Owner to correct defective Work or complete the Work in accordance with section 5.17;
4. Failure to perform in accordance with the Contract Documents; or
5. Cost or liability that may occur to Owner as the result of Contractor's fault or negligent acts or omissions.

B. In any case where part or all of a payment is going to be withheld for unsatisfactory performance, Owner shall notify Contractor in accordance with RCW 39.76.

6.06 RETAINAGE AND BOND CLAIM RIGHTS

A. Prior to release of the contract retainage, an "Affidavit of Wages Paid", approved by the Washington State Department of Labor and Industries, must be on file in the Owner's office. Contracts over $20,000, including tax, necessitate a clearance from the Washington State Department of Revenue and the Washington State Department of Employment Security. The Owner shall initiate action for the releases from the Departments of Revenue and Employment Security.

B. RCW chapters 39.08 and 60.28, concerning the rights and responsibilities of Contractor and Owner with regard to the performance and payment bonds and retainage, are made a part of the Contract Documents by reference as though fully set forth herein.

C. In accordance with RCW 60.28, the lien period for filing liens against the contract retainage shall be forty-five (45) days. Persons performing labor or furnishing supplies toward the completion of the contract who intend to file a lien against the contract retainage must do so within forty-five (45) days from the date of Final Acceptance of the contract by the Owner and in the manner as described in RCW 39.08.030.

6.07 SUBSTANTIAL COMPLETION

Substantial Completion is the stage in the progress of the Work (or portion thereof designated and approved by Owner) when the construction is sufficiently complete, in accordance with the Contract Documents, so Owner can fully occupy the Work (or the designated portion thereof) for the use for which it is intended. All Work other than incidental corrective or punch list work shall be completed. Substantial Completion shall not have been achieved if all systems and parts are not functional, if utilities are not connected and operating normally, if all required occupancy permits have not been issued, or if the Work is not accessible by normal vehicular and pedestrian traffic routes. The date Substantial Completion is achieved shall be established in writing by Owner. Contractor may request an early date of Substantial Completion which must be approved by Change Order. Owner's occupancy of the Work or designated portion thereof does not necessarily indicate that Substantial Completion has been achieved.

6.08 PRIOR OCCUPANCY

A. Owner may, upon written notice thereof to Contractor, take possession of or use any completed or partially completed portion of the Work ("Prior Occupancy") at any time prior to Substantial Completion. Unless otherwise agreed in writing, Prior Occupancy shall not: be deemed an acceptance of any portion of the

Work; accelerate the time for any payment to Contractor; prejudice any rights of Owner provided by any insurance, bond, guaranty, or the Contract Documents; relieve Contractor of the risk of loss or any of the obligations established by the Contract Documents; establish a date for termination or partial termination of the assessment of liquidated damages; or constitute a waiver of claims.

B. Notwithstanding anything in the preceding paragraph, Owner shall be responsible for loss of or damage to the Work resulting from Prior Occupancy. Contractor's one (1) year duty to repair and any system warranties shall begin on building systems activated and used by Owner as agreed in writing by Owner and Contractor.

6.09 FINAL COMPLETION, ACCEPTANCE, AND PAYMENT

A. Final Completion shall be achieved when the Work is fully and finally complete in accordance with the Contract Documents. The date Final Completion is achieved shall be established by Owner in writing.

B. Final Acceptance is the formal action of Owner acknowledging Final Completion. Prior to Final Acceptance, Contractor shall, in addition to all other requirements in the Contract Documents, submit to Owner a written notice of any outstanding disputes or claims between Contractor and any of its Subcontractors, including the amounts and other details thereof. Neither Final Acceptance, nor final payment, shall release Contractor or its sureties from any obligations of these Contract Documents or the Public Works Bond, or constitute a waiver of any claims by Owner arising from Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Acceptance of final payment by Contractor, or any Subcontractor, shall constitute a waiver and release to Owner of all claims by Contractor, or any such Subcontractor, for an increase in the Contract Sum or the Contract Time, and for every act or omission of Owner relating to or arising out of the Work, except for those Claims made in accordance with the procedures, including the time limits, set forth in part 8.

PART 7 - CHANGES

7.01 CHANGES IN THE WORK

A. Owner may, at any time and without notice to Contractor's surety, order additions, deletions, revisions, or other changes in the Work. These changes in the Work shall be incorporated into the Contract Documents through the execution of Change Orders. If any change in the Work ordered by Owner causes an increase or decrease in the Contract Sum or the Contract Time, an equitable adjustment shall be made as provided in section 7.02 or 7.03, respectively, and such adjustment(s) shall be incorporated into a Change Order.

B. If Owner desires to order a change in the Work, it may request a written Change Order Proposal (COP) from Contractor. Contractor shall submit a Change Order Proposal within 14 (fourteen) days of the request from Owner, or within such other period as mutually agreed. Contractor's Change Order Proposal shall be full compensation for implementing the proposed change in the Work, including any adjustment in the Contract Sum or Contract Time, and including compensation for all delays in connection with such change in the Work and for any expense or inconvenience, disruption of schedule, or loss of efficiency or productivity occasioned by the change in the Work.

C. Upon receipt of the Change Order proposal, or a request for equitable adjustment in the Contract Sum or Contract Time, or both, as provided in sections 7.02 and 7.03, Owner may accept or reject the proposal, request further documentation, or negotiate acceptable terms with Contractor. Pending agreement on the terms of the Change Order, Owner may direct Contractor to proceed immediately with the Change Order Work. Contractor shall not proceed with any change in the Work until it has obtained Owner's approval. All Work done pursuant to any Owner-directed change in the Work shall be executed in accordance with the Contract Documents.

D. If Owner and Contractor reach agreement on the terms of any change in the Work, including any adjustment in the Contract Sum or Contract Time, such agreement shall be incorporated in a Change Order. The Change Order shall constitute full payment and final settlement of all claims for time and for direct, indirect, and consequential costs, including costs of delays, inconvenience, disruption of schedule, or loss of efficiency or productivity, related to any Work either covered or affected by the Change Order, or related to the events giving rise to the request for equitable adjustment.

E. If Owner and Contractor are unable to reach agreement on the terms of any change in the Work, including any adjustment in the Contract Sum or Contract Time, Contractor may at any time in writing, request a final offer from Owner. Owner shall provide Contractor with its written response within 30 (thirty) days of Contractor's request. Owner may also provide Contractor with a final offer at any time. If Contractor rejects Owner's final offer, or the parties are otherwise unable to reach agreement, Contractor's only remedy shall be to file a Claim as provided in part 8.

F. Field Authorization

1. The Field Authorization (FA) is executed as a directive to proceed with work when the processing time for an approved change order would impact the project.

2. A scope of work must be defined, a maximum not to exceed cost agreed upon, and any estimated modification to the contract completion time determined. The method of final cost verification must be noted and supporting cost data must be submitted in accordance with the requirements of Part 7 of the General Conditions. Upon satisfactory submittal and approval of supporting cost data, the completed FA will be processed into a change order. No payment will be made to the Contractor for FA work until that FA is converted to a Change Order.

7.02 CHANGES IN THE CONTRACT SUM

A. General Application

1. The Contract Sum shall only be changed by a Change Order. Contractor shall include any request for a change in the Contract Sum in its Change Order Proposal.

2. If the cost of Contractor's performance is changed due to the fault or negligence of Owner, or anyone for whose acts Owner is responsible, Contractor shall be entitled to make a request for an equitable adjustment in the Contract Sum in accordance with the following procedure. No change in the Contract Sum shall be allowed to the extent: Contractor's changed cost of performance is due to the fault or negligence of Contractor, or anyone for whose acts Contractor is responsible; the change is concurrently caused by Contractor and Owner; or the change is caused by an act of Force Majeure as defined in Section 3.05.

a. A request for an equitable adjustment in the Contract Sum shall be based on written notice delivered to Owner within 7 (seven) days of the occurrence of the event giving rise to the request. For purposes of this part, "occurrence" means when Contractor knew, or in its diligent prosecution of the Work should have known, of the event giving rise to the request. If Contractor believes it is entitled to an adjustment in the Contract Sum, Contractor shall immediately notify Owner and begin to keep and maintain complete, accurate, and specific daily records. Contractor shall give Owner access to any such records and, if requested shall promptly furnish copies of such records to Owner.

b. Contractor shall not be entitled to any adjustment in the Contract Sum for any occurrence of events or costs that occurred more than 7 (seven) days before Contractor's written notice to Owner. The written notice shall set forth, at a minimum, a description of: the event giving rise to the request for an equitable adjustment in the Contract Sum; the nature of the impacts to Contractor and its Subcontractors of any tier, if any; and to the extent possible the amount of the adjustment in Contract Sum requested. Failure to properly give such written notice shall, to the extent Owner’s interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.

c. Within 30 (thirty) days of the occurrence of the event giving rise to the request, unless Owner agrees in writing to allow an additional period of time to ascertain more accurate data, Contractor shall supplement the written notice provided in accordance with subparagraph a. above with additional supporting data. Such additional data shall include, at a minimum: the amount of compensation requested, itemized in accordance with the procedure set forth herein; specific facts, circumstances, and analysis that confirms not only that Contractor suffered the damages claimed, but that the damages claimed were actually a result of the act, event, or condition complained of and that the Contract Documents provide entitlement to an equitable adjustment to Contractor for

such act, event, or condition; and documentation sufficiently detailed to permit an informed analysis of the request by Owner. When the request for compensation relates to a delay, or other change in Contract Time, Contractor shall demonstrate the impact on the critical path, in accordance with section 7.03C. Failure to provide such additional information and documentation within the time allowed or within the format required shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.

d. Pending final resolution of any request made in accordance with this paragraph, unless otherwise agreed in writing, Contractor shall proceed diligently with performance of the Work.

e. Any requests by Contractor for an equitable adjustment in the Contract Sum and in the Contract Time that arise out of the same event(s) shall be submitted together.

3. The value of any Work covered by a Change Order, or of any request for an equitable adjustment in the Contract Sum, shall be determined by one of the following methods:

   a. On the basis of a fixed price as determined in paragraph 7.02B.
   b. By application of unit prices to the quantities of the items involved as determined in paragraph 7.02C.
   c. On the basis of time and material as determined in paragraph 7.02D.

4. When Owner has requested Contractor to submit a Change Order proposal, Owner may direct Contractor as to which method in subparagraph 3 above to use when submitting its proposal. Otherwise, Contractor shall determine the value of the Work, or a request for an equitable adjustment, on the basis of the fixed price method.

B. Change Order Pricing -- Fixed Price

When the fixed price method is used to determine the value of any Work covered by a Change Order or a request for an equitable adjustment in the Contract Sum, the following procedures shall apply:

1. Contractor's Change Order Proposal, or request for adjustment in the Contract Sum, shall be accompanied by a complete itemization of the costs, including labor, material, subcontractor costs, and overhead and profit. The costs shall be itemized in the manner set forth below, and shall be submitted on breakdown sheets in a form approved by Owner.

2. All costs shall be calculated based upon appropriate industry standard methods of calculating labor, material quantities, and equipment costs.

3. If any of Contractor's pricing assumptions are contingent upon anticipated actions of Owner, Contractor shall clearly state them in the proposal or request for an equitable adjustment.

4. The cost of any additive or deductive changes in the Work shall be calculated as set forth below, except that overhead and profit shall not be included on deductive changes in the Work. Where a change in the Work involves additive and deductive work by the same Contractor or Subcontractor, small tools, overhead, profit, bond, and insurance markups will apply to the net difference.

5. If the total cost of the change in the Work or request for equitable adjustment does not exceed $1,000, Contractor shall not be required to submit a breakdown if the description of the change in the Work or request for equitable adjustment is sufficiently definitive for Owner to determine fair value.

6. If the total cost of the change in the Work or request for equitable adjustment is between $1,000 and $2,500, Contractor may submit a breakdown in the following level of detail if the description of the change in the Work or if the request for equitable adjustment is sufficiently definitive to permit the Owner to determine fair value:

   a. lump sum labor;
   b. lump sum material;
   c. lump sum equipment usage;
   d. overhead and profit as set forth below; and
   e. insurance and bond costs as set forth below.

7. Any request for adjustment of Contract Sum based upon the fixed price method shall include only the following items:

   a. Craft labor costs: These are the labor costs determined by multiplying the estimated or actual additional number of craft hours needed to perform the change in the Work by the hourly labor costs. Craft hours should cover direct labor, as well as indirect labor due to trade inefficiencies. The hourly costs shall be based on the following:

      1) Basic wages and benefits: Hourly rates and benefits as stated on the Department of Labor and Industries approved "statement of intent to pay prevailing wages." Direct supervision shall be a reasonable percentage not to exceed 15% (fifteen percent) of the cost of direct labor. No supervision markup shall be allowed for a working supervisor's hours.

      2) Worker's insurance: Direct contributions to the state of Washington for industrial insurance; medical aid; and supplemental pension, by the class and rates established by the Department of Labor and Industries.

      3) Federal insurance: Direct contributions required by the Federal Insurance Compensation Act; Federal Unemployment Tax Act; and the State Unemployment Compensation Act.

      4) Travel allowance: Travel allowance and/or subsistence, if applicable, not exceeding those allowances established by regional labor union agreements, which are itemized and identified separately.

      5) Safety: Cost incurred due to the Washington Industrial Safety and Health Act, which shall be a reasonable percentage not to exceed 2% (two percent) of the sum of the amounts calculated in (1), (2), and (3) above.

   b. Material costs: This is an itemization of the quantity and cost of materials needed to perform the change in the Work. Material costs shall be developed first from actual known costs, second from supplier quotations or if these are not available, from standard industry pricing guides. Material costs shall consider all available discounts. Freight costs, express charges, or special delivery charges, shall be itemized.

   c. Equipment costs: This is an itemization of the type of equipment and the estimated or actual length of time the construction equipment appropriate for the Work is or will be used on the change in the Work. Costs will be allowed for construction equipment only if used solely for the changed Work, or for additional rental costs actually incurred by the Contractor. Equipment charges shall be computed on the basis of actual invoice costs or if owned, from the current edition of one of the following sources:

      1) Associated General Contractors - Washington State Department of Transportation (AGC-WSDOT) Equipment Rental Agreement; current edition, on the Contract execution date.

      2) The state of Washington Utilities and Transportation Commission for trucks used on highways.

      3) The National Electrical Contractors Association for equipment used on electrical work.

      4) The Mechanical Contractors Association of America for equipment used on mechanical work.

      The Data Quest Rental Rate (Blue Book) shall be used as a basis for establishing rental rates of equipment not listed in the above sources. The maximum rate for standby equipment shall not exceed that shown in the AGC WSDOT Equipment Rental Agreement, current edition, on the Contract execution date.

   d. Allowance for small tools, expendables, and consumable supplies: Small tools consist of tools which cost $250 or less and are normally furnished by the performing contractor. The maximum rate for small tools shall not exceed the following:

1) For Contractor, 3% (three percent) of direct labor costs.

2) For Subcontractors, 5% (five percent) of direct labor costs.

Expendables and consumable supplies directly associated with the change in Work must be itemized.

e. Subcontractor costs: This is defined as payments Contractor makes to Subcontractors for changed Work performed by Subcontractors of any tier. The Subcontractors' cost of Work shall be calculated and itemized in the same manner as prescribed herein for Contractor.

f. Allowance for overhead: This is defined as costs of any kind attributable to direct and indirect delay, acceleration, or impact, added to the total cost to Owner of any change in the Contract Sum but not to the cost of any change in the Contract Time for which contractor has been compensated pursuant to the conditions set forth in Section 7.03. This allowance shall compensate Contractor for all non-craft labor, temporary construction facilities, field engineering, schedule updating, record drawings, home office cost, B&O taxes, office engineering, estimating costs, additional overhead because of extended time, and any other cost incidental to the change in the Work. It shall be strictly limited in all cases to a reasonable amount, mutually acceptable, or if none can be agreed upon to an amount not to exceed the rates below:

1) For projects where the Contract Award Amount is under $3 million, the following shall apply:

a) For Contractor, for any Work actually performed by Contractor's own forces, 16% (sixteen percent) of the first $50,000 of the cost, and 4% (four percent) of the remaining cost, if any.

b) For each Subcontractor (including lower tier subcontractors), for any Work actually performed by its own forces, 16% (sixteen percent) of the first $50,000 of the cost, and 4% (four percent) of the remaining cost, if any.

c) For Contractor, for any work performed by its Subcontractor(s), 6% (six percent) of the first $50,000 of the amount due each Subcontractor, and 4% (four percent) of the remaining amount if any.

d) For each Subcontractor, for any Work performed by its Subcontractor(s) of any lower tier, 4% (four percent) of the first $50,000 of the amount due the sub-Subcontractor, and 2% (two percent) of the remaining amount if any.

e) The cost to which overhead is to be applied shall be determined in accordance with subparagraphs a.-e. above.

2) For projects where the Contract Award Amount is equal to or exceeds $3 million, the following shall apply:

a) For Contractor, for any Work actually performed by Contractor's own forces, 12% (twelve percent) of the first $50,000 of the cost, and 4% (four percent) of the remaining cost, if any.

b) For each Subcontractor (including lower tier subcontractors), for any Work actually performed by its own forces, 12% (twelve percent) of the first $50,000 of the cost, and 4% (four percent) of the remaining cost, if any.

c) For Contractor, for any Work performed by its Subcontractor(s), 4% (four percent) of the first $50,000 of the amount due each Subcontractor, and 2% (two percent) of the remaining amount if any.

d) For each Subcontractor, for any Work performed by its Subcontractor(s) of any lower tier, 4% (four percent) of the first $50,000 of the amount due the sub-Subcontractor, and 2% (two percent) of the remaining amount if any.

e) The cost to which overhead is to be applied shall be determined in accordance with subparagraphs a.- e. above.

g. Allowance for profit: This is an amount to be added to the cost of any change in contract sum, but not to the cost of change in Contract Time for which contractor has been compensated pursuant to the conditions set forth in section 7.03. It shall be limited to a reasonable amount, mutually acceptable, or if none can be agreed upon, to an amount not to exceed the rates below:

1) For Contractor or Subcontractor of any tier for work performed by their forces, 6% (six percent) of the cost developed in accordance with Section 7.02 b. 7a.- e.

2) For Contractor or Subcontractor of any tier for work performed by a subcontractor of a lower tier, 4% (four percent) of the Subcontractor cost developed in accordance with Section 7.02 b. 7a. - h.

h. Cost of change in insurance or bond premium: This is defined as:

1) Contractor's liability insurance: The cost of any changes in Contractor's liability insurance arising directly from execution of the Change Order; and

2) Public works bond: The cost of the additional premium for Contractor's bond arising directly from the changed Work.

The costs of any change in insurance or bond premium shall be added after overhead and allowance for profit are calculated in accordance with subparagraph f. and g. above.

C. Change Order Pricing -- Unit Prices

1. Whenever Owner authorizes Contractor to perform Work on a unit-price basis, Owner's authorization shall clearly state:

a. Scope of work to be performed;
b. Type of reimbursement including pre-agreed rates for material quantities; and
c. Cost limit of reimbursement.

2. Contractor shall:

a. Cooperate with Owner and assist in monitoring the Work being performed. As requested by Owner, Contractor shall identify workers assigned to the Change Order Work and areas in which they are working;
b. Leave access as appropriate for quantity measurement; and
c. Not exceed any cost limit(s) without Owner's prior written approval.

3. Contractor shall submit costs in accordance with paragraph 7.02B. and satisfy the following requirements:

a. Unit prices shall include reimbursement for all direct and indirect costs of the Work, including overhead and profit, and bond and insurance costs; and
b. Quantities must be supported by field measurement statements signed by Owner.

D. Change Order Pricing -- Time-and-Material Prices

1. Whenever Owner authorizes Contractor to perform Work on a time-and-material basis, Owner's authorization shall clearly state:

a. Scope of Work to be performed;
b. Type of reimbursement including pre-agreed rates, if any, for material quantities or labor; and
c. Cost limit of reimbursement.

2. Contractor shall:

a. Cooperate with Owner and assist in monitoring the Work being performed. As requested by Owner, identify workers assigned to the Change Order Work and areas in which they are working;
b. Identify on daily time sheets all labor performed in accordance with this authorization. Submit copies of daily time sheets within 2 working days for Owner's review;
c. Leave access as appropriate for quantity measurement;
d. Perform all Work in accordance with this section as efficiently as possible; and
e. Not exceed any cost limit(s) without Owner's prior written approval.

3. Contractor shall submit costs in accordance with paragraph 7.02B and additional verification supported by:

a. Labor detailed on daily time sheets; and
b. Invoices for material.

7.03 CHANGES IN THE CONTRACT TIME

A. The Contract Time shall only be changed by a Change Order. Contractor shall include any request for a change in the Contract Time in its Change Order Proposal.

B. If the time of Contractor's performance is changed due to an act of Force Majeure, or due to the fault or negligence of Owner or anyone for whose acts Owner is responsible, Contractor shall be entitled to make a request for an equitable adjustment in the Contract Time in accordance with the following procedure. No adjustment in the Contract Time shall be allowed to the extent Contractor's changed time of performance is due to the fault or negligence of Contractor, or anyone for whose acts Contractor is responsible.

1. A request for an equitable adjustment in the Contract Time shall be based on written notice delivered within 7 (seven) days of the occurrence of the event giving rise to the request. If Contractor believes it is entitled to adjustment of Contract Time, Contractor shall immediately notify Owner and begin to keep and maintain complete, accurate, and specific daily records. Contractor shall give Owner access to any such record and if requested, shall promptly furnish copies of such record to Owner.

2. Contractor shall not be entitled to an adjustment in the Contract Time for any events that occurred more than 7 (seven) days before Contractor's written notice to Owner. The written notice shall set forth, at a minimum, a description of: the event giving rise to the request for an equitable adjustment in the Contract Time; the nature of the impacts to Contractor and its Subcontractors of any tier, if any; and to the extent possible the amount of the adjustment in Contract Time requested. Failure to properly give such written notice shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.

3. Within 30 (thirty) days of the occurrence of the event giving rise to the request, unless Owner agrees in writing to allow an additional period of time to ascertain more accurate data, Contractor shall supplement the written notice provided in accordance with subparagraph 7.03B.2 with additional supporting data. Such additional data shall include, at a minimum: the amount of delay claimed, itemized in accordance with the procedure set forth herein; specific facts, circumstances, and analysis that confirms not only that Contractor suffered the delay claimed, but that the delay claimed was actually a result of the act, event, or condition complained of, and that the Contract Documents provide entitlement to an equitable adjustment in Contract Time for such act, event, or condition; and supporting documentation sufficiently detailed to permit an informed analysis of the request by Owner. Failure to provide such additional information and documentation within the time allowed or within the format required shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.

4. Pending final resolution of any request in accordance with this paragraph, unless otherwise agreed in writing, Contractor shall proceed diligently with performance of the Work.

C. Any change in the Contract Time covered by a Change Order, or based on a request for an equitable adjustment in the Contract Time, shall be limited to the change in the critical path of Contractor's schedule attributable to the change of Work or event(s) giving rise to the request for equitable adjustment. Any Change Order proposal or request for an adjustment in the Contract Time shall demonstrate the impact on the critical path of the schedule. Contractor shall be responsible for showing clearly on the Progress

Schedule that the change or event: had a specific impact on the critical path, and except in case of concurrent delay, was the sole cause of such impact; and could not have been avoided by resequencing of the Work or other reasonable alternatives.

D. Contractor may request compensation for the cost of a change in Contract Time in accordance with this paragraph, 7.03D, subject to the following conditions:

1. The change in Contract Time shall solely be caused by the fault or negligence of Owner or A/E;

2. Compensation under this paragraph is limited to changes in Contract Time for which Contractor is not entitled to be compensated under section 7.02;

3. Contractor shall follow the procedure set forth in paragraph 7.03B;

4. Contractor shall establish the extent of the change in Contract Time in accordance with paragraph 7.03C; and

5. The daily cost of any change in Contract Time shall be limited to the items below, less funds that may have been paid pursuant to a change in the Contract Sum that contributed to this change in Contract Time:

   a. cost of nonproductive field supervision or labor extended because of the delay;
   b. cost of weekly meetings or similar indirect activities extended because of the delay;
   c. cost of temporary facilities or equipment rental extended because of the delay;
   d. cost of insurance extended because of the delay;
   e. general and administrative overhead in an amount to be agreed upon, but not to exceed 3% (three percent) of Contract Sum divided by the Contract Time for each day of the delay.

PART 8 - CLAIMS AND DISPUTE RESOLUTION

8.01 CLAIMS PROCEDURE

A. If the parties fail to reach agreement on the terms of any Change Order for Owner-directed Work as provided in section 7.01, or on the resolution of any request for an equitable adjustment in the Contract Sum as provided in section 7.02 or the Contract Time as provided in section 7.03, Contractor's only remedy shall be to file a Claim with Owner as provided in this section.

B. Contractor shall file its Claim within the earlier of: 120 (one hundred twenty) days from Owner's final offer in accordance with either paragraph 7.01E or the date of Final Acceptance.

C. The Claim shall be deemed to cover all changes in cost and time (including direct, indirect, impact, and consequential) to which Contractor may be entitled. It shall be fully substantiated and documented. At a minimum, the Claim shall contain the following information:

1. A detailed factual statement of the Claim for additional compensation and time, if any, providing all necessary dates, locations, and items of Work affected by the Claim;

2. The date on which facts arose which gave rise to the Claim

3. The name of each employee of Owner or A/E knowledgeable about the Claim;

4. The specific provisions of the Contract Documents which support the Claim;

5. The identification of any documents and the substance of any oral communications that support the Claim;

6. Copies of any identified documents, other than the Contract Documents, that support the Claim;

7. If an adjustment in the Contract Time is sought: the specific days and dates for which it is sought; the specific reasons Contractor believes an extension in the Contract Time should be granted; and Contractor's analysis of its Progress Schedule to demonstrate the reason for the extension in Contract Time;

8. If an adjustment in the Contract Sum is sought, the exact amount sought and a breakdown of that amount into the categories set forth in, and in the detail required by, section 7.02; and

9. A statement certifying, under penalty of perjury, that the Claim is made in good faith, that the supporting cost and pricing data are true and accurate to the best of Contractor's knowledge and belief, that the Claim is fully supported by the accompanying data, and that the amount requested accurately reflects the adjustment in the Contract Sum or Contract Time for which Contractor believes Owner is liable.

D. After Contractor has submitted a fully documented Claim that complies with all applicable provisions of parts 7 and 8, Owner shall respond, in writing, to Contractor as follows:

1. If the Claim amount is less than $50,000, with a decision within 60 (sixty) days from the date the Claim is received; or

2. If the Claim amount is $50,000 or more, with a decision within 60 (sixty) days from the date the Claim is received, or with notice to Contractor of the date by which it will render its decision. Owner will then respond with a written decision in such additional time.

E. To assist in the review of Contractor's Claim, Owner may visit the Project site, or request additional information, in order to fully evaluate the issues raised by the Claim. Contractor shall proceed with performance of the Work pending final resolution of any Claim. Owner's written decision as set forth above shall be final and conclusive as to all matters set forth in the Claim, unless Contractor follows the procedure set forth in section 8.02.

F. Any Claim of the Contractor against the Owner for damages, additional compensation, or additional time, shall be conclusively deemed to have been waived by the Contractor unless timely made in accordance with the requirements of this section.

8.02 ARBITRATION

A. If Contractor disagrees with Owner's decision rendered in accordance with paragraph 8.01D, Contractor shall provide Owner with a written demand for arbitration. No demand for arbitration of any such Claim shall be made later than 30 (thirty) days after the date of Owner's decision on such Claim; failure to demand arbitration within said 30-day period shall result in Owner's decision being final and binding upon Contractor and its Subcontractors.

B. Notice of the demand for arbitration shall be filed with the American Arbitration Association (AAA), with a copy provided to Owner. The parties shall negotiate or mediate under the Voluntary Construction Mediation Rules of the AAA, or mutually acceptable service, before seeking arbitration in accordance with the Construction Industry Arbitration Rules of AAA as follows:

1. Disputes involving $30,000 or less shall be conducted in accordance with the Northwest Region Expedited Commercial Arbitration Rules; or

2. Disputes over $30,000 shall be conducted in accordance with the Construction Industry Arbitration Rules of the AAA, unless the parties agree to use the expedited rules.

C. All Claims arising out of the Work shall be resolved by arbitration. The judgment upon the arbitration award may be entered, or review of the award may occur, in the superior court having jurisdiction thereof. No independent legal action relating to or arising from the Work shall be maintained.

D. Claims between Owner and Contractor, Contractor and its Subcontractors, Contractor and A/E, and Owner and A/E shall, upon demand by Owner, be submitted in the same arbitration or mediation.

E. If the parties resolve the Claim prior to arbitration judgment, the terms of the resolution shall be incorporated in a Change Order. The Change Order shall constitute full payment and final settlement of the Claim, including all claims for time and for direct, indirect, or consequential costs, including costs of delays, inconvenience, disruption of schedule, or loss of efficiency or productivity.

8.03 CLAIMS AUDITS

A. All Claims filed against Owner shall be subject to audit at any time following the filing of the Claim. Failure of Contractor, or Subcontractors of any tier, to maintain and retain sufficient records to allow Owner to verify all or a portion of the Claim or to permit Owner access to the books and records of Contractor, or Subcontractors of any tier, shall constitute a waiver of the Claim and shall bar any recovery.

B. In support of Owner audit of any Claim, Contractor shall, upon request, promptly make available to Owner the following documents:

1. Daily time sheets and supervisor's daily reports;
2. Collective bargaining agreements;
3. Insurance, welfare, and benefits records;
4. Payroll registers;
5. Earnings records;
6. Payroll tax forms;
7. Material invoices, requisitions, and delivery confirmations;
8. Material cost distribution worksheet;
9. Equipment records (list of company equipment, rates, etc.);
10. Vendors', rental agencies', Subcontractors', and agents' invoices;
11. Contracts between Contractor and each of its Subcontractors, and all lower-tier Subcontractor contracts and supplier contracts;
12. Subcontractors' and agents' payment certificates;
13. Cancelled checks (payroll and vendors);
14. Job cost report, including monthly totals;
15. Job payroll ledger;
16. Planned resource loading schedules and summaries;
17. General ledger;
18. Cash disbursements journal;
19. Financial statements for all years reflecting the operations on the Work. In addition, the Owner may require, if it deems it appropriate, additional financial statements for 3 (three) years preceding execution of the Work;
20. Depreciation records on all company equipment whether these records are maintained by the company involved, its accountant, or others;
21. If a source other than depreciation records is used to develop costs for Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all such other source documents;
22. All non-privileged documents which relate to each and every Claim together with all documents which support the amount of any adjustment in Contract Sum or Contract Time sought by each Claim;
23. Work sheets or software used to prepare the Claim establishing the cost components for items of the Claim including but not limited to labor, benefits and insurance, materials, equipment, Subcontractors,

all documents which establish the time periods, individuals involved, the hours for the individuals, and the rates for the individuals; and

24. Work sheets, software, and all other documents used by Contractor to prepare its bid.

C. The audit may be performed by employees of Owner or a representative of Owner. Contractor, and its Subcontractors, shall provide adequate facilities acceptable to Owner, for the audit during normal business hours. Contractor, and all Subcontractors, shall make a good faith effort to cooperate with Owner's auditors.

PART 9 - TERMINATION OF THE WORK

9.01 TERMINATION BY OWNER FOR CAUSE

A. Owner may, upon 7 (seven) days written notice to Contractor and to its surety, terminate (without prejudice to any right or remedy of Owner) the Work, or any part of it, for cause upon the occurrence of any one or more of the following events:

1. Contractor fails to prosecute the Work or any portion thereof with sufficient diligence to ensure Substantial Completion of the Work within the Contract Time;
2. Contractor is adjudged bankrupt, makes a general assignment for the benefit of its creditors or a receiver is appointed on account of its insolvency;
3. Contractor fails in a material way to replace or correct Work not in conformance with the Contract Documents;
4. Contractor repeatedly fails to supply skilled workers or proper materials or equipment;
5. Contractor repeatedly fails to make prompt payment due to Subcontractors or for labor;
6. Contractor materially disregards or fails to comply with laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction; or
7. Contractor is otherwise in material breach of any provision of the Contract Documents.

B. Upon termination, Owner may at its option:

1. Take possession of the Project site and take possession of or use all materials, equipment, tools, and construction equipment and machinery thereon owned by Contractor to maintain the orderly progress of, and to finish, the Work;
2. Accept assignment of subcontracts pursuant to section 5.20; and
3. Finish the Work by whatever other reasonable method it deems expedient.

C. Owner's rights and duties upon termination are subject to the prior rights and duties of the surety, if any, obligated under any bond provided in accordance with the Contract Documents.

D. When Owner terminates the Work in accordance with this section, Contractor shall take the actions set forth in paragraph 9.02B, and shall not be entitled to receive further payment until the Work is accepted.

E. If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work, including compensation for A/E's services and expenses made necessary thereby and any other extra costs or damages incurred by Owner in completing the Work, or as a result of Contractor's actions, such excess shall be paid to Contractor. If such costs exceed the unpaid balance, Contractor shall pay the difference to Owner. These obligations for payment shall survive termination.

F. Termination of the Work in accordance with this section shall not relieve Contractor or its surety of any responsibilities for Work performed.

G. If Owner terminates Contractor for cause, and it is later determined that none of the circumstances set forth in paragraph 9.01A exist, then such termination shall be deemed a termination for convenience pursuant to section 9.02.

9.02 TERMINATION BY OWNER FOR CONVENIENCE

A. Owner may, upon written notice, terminate (without prejudice to any right or remedy of Owner) the Work, or any part of it, for the convenience of Owner.

B. Unless Owner directs otherwise, after receipt of a written notice of termination for either cause or convenience, Contractor shall promptly:

1. Stop performing Work on the date and as specified in the notice of termination;

2. Place no further orders or subcontracts for materials, equipment, services or facilities, except as may be necessary for completion of such portion of the Work as is not terminated;

3. Cancel all orders and subcontracts, upon terms acceptable to Owner, to the extent that they relate to the performance of Work terminated;

4. Assign to Owner all of the right, title, and interest of Contractor in all orders and subcontracts;

5. Take such action as may be necessary or as directed by Owner to preserve and protect the Work, Project site, and any other property related to this Project in the possession of Contractor in which Owner has an interest; and

6. Continue performance only to the extent not terminated.

C. If Owner terminates the Work or any portion thereof for convenience, Contractor shall be entitled to make a request for an equitable adjustment for its reasonable direct costs incurred prior to the effective date of the termination, plus a reasonable allowance for overhead and profit on Work performed prior to termination, plus the reasonable administrative costs of the termination, but shall not be entitled to any other costs or damages, whatsoever, provided however, the total sum payable upon termination shall not exceed the Contract Sum reduced by prior payments. Contractor shall be required to make its request in accordance with the provisions of part 7.

D. If Owner terminates the Work or any portion thereof for convenience, the Contract Time shall be adjusted as determined by Owner.

PART 10 - MISCELLANEOUS PROVISIONS

10.01 GOVERNING LAW

The Contract Documents and the rights of the parties herein shall be governed by the laws of the state of Washington. Venue shall be in the county in which Owner's principal place of business is located, unless otherwise specified.

10.02 SUCCESSORS AND ASSIGNS

Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents. Neither party shall assign the Work without written consent of the other, except that Contractor may assign the Work for security purposes, to a bank or lending institution authorized to do business in the state of Washington. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations set forth in the Contract Documents.

10.03 MEANING OF WORDS

Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Reference to standard specifications, manuals, or codes of any technical society, organization, or association, or

to the code of any governmental authority, whether such reference be specific or by implication, shall be to the latest standard specification, manual, or code in effect on the date for submission of bids, except as may be otherwise specifically stated. Wherever in these Drawings and Specifications an article, device, or piece of equipment is referred to in the singular manner, such reference shall apply to as many such articles as are shown on the drawings, or required to complete the installation.

10.04 RIGHTS AND REMEDIES

No action or failure to act by Owner or A/E shall constitute a waiver of a right or duty afforded them under the Contract Documents, nor shall such action or failure to act constitute approval of an acquiescence in a breach therein, except as may be specifically agreed in writing.

10.05 CONTRACTOR REGISTRATION

Pursuant to RCW 39.06, Contractor shall be registered or licensed as required by the laws of the State of Washington, including but not limited to RCW 18.27.

10.06 TIME COMPUTATIONS

When computing any period of time, the day of the event from which the period of time begins shall not be counted. The last day is counted unless it falls on a weekend or legal holiday, in which event the period runs until the end of the next day that is not a weekend or holiday. When the period of time allowed is less than 7 (seven) days, intermediate Saturdays, Sundays, and legal holidays are excluded from the computation.

10.07 RECORDS RETENTION

The wage, payroll, and cost records of Contractor, and its Subcontractors, and all records subject to audit in accordance with section 8.03, shall be retained for a period of not less than 6 (six) years after the date of Final Acceptance.

10.08 THIRD-PARTY AGREEMENTS

The Contract Documents shall not be construed to create a contractual relationship of any kind between: A/E and Contractor; Owner and any Subcontractor; or any persons other than Owner and Contractor.

10.09 ANTITRUST ASSIGNMENT

Owner and Contractor recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the purchaser. Therefore, Contractor hereby assigns to Owner any and all claims for such overcharges as to goods, materials, and equipment purchased in connection with the Work performed in accordance with the Contract Documents, except as to overcharges which result from antitrust violations commencing after the Contract Sum is established and which are not passed on to Owner under a Change Order. Contractor shall put a similar clause in its Subcontracts, and require a similar clause in its sub-Subcontracts, such that all claims for such overcharges on the Work are passed to Owner by Contractor.

10.10 MINORITY AND WOMEN'S BUSINESS ENTERPRISES (MWBE) PARTICIPATION

In Accordance with the legislative findings and policies set forth in Chapter 39.19 RCW the State of Washington encourages participation in all of its contracts by MWBE firms certified by the Office of Minority and Women's Business Enterprises (OMWBE). Participation may be either on a direct basis in response to this solicitation or as a subcontractor to a Bidder. Any affirmative action requirements set forth in federal regulations or statutes included or referenced in the contract documents will apply. Bidders may contact OMWBE to obtain information on certified firms for potential subcontractors/suppliers.

A. When referred to in this Contract, the terms Minority Business Enterprise (MBE) and Women's Business Enterprise (WBE) will be as defined by OMWBE, WAC 326-02-030.

B. The OMWBE has compiled a directory of certified firms. Copies of this directory may be obtained through the OMWBE. For information regarding the certification process or the certification status of a particular firm, contact:

OMWBE, 406 South Water Street, PO Box 41160, Olympia, WA 98504-1160, telephone (360) 753-9693.

C. Eligible MWBEs or M/W firms

MWBE firms utilized for this project for voluntary MWBE goals may be certified by Washington State OMWBE or self identified as minority or women owned (M/W firm).

D. MWBE Voluntary Goals

The Owner has established voluntary goals for MWBE participation for this project. The voluntary goals are set forth in the Advertisement for Bids.

E. If any part of the contract, including the supply of materials and equipment, is anticipated to be subcontracted, then prior to receipt of the first payment, Contractor shall submit, pursuant to Section 5.20 A, a list of all subcontractors/suppliers it intends to use, designate whether any of the subcontractors/suppliers are MWBE firms, indicate the anticipated dollar value of each MWBE subcontract, and provide Tax Identification Number (TIN).

F. If any part of the contract, including the supply of materials and equipment is actually subcontracted during completion of the work, then prior to final acceptance or completion of the contract or as otherwise indicated in the contract documents, the Contractor shall submit a statement of participation indicating what MWBEs were used and the dollar value of their subcontracts.

G. The provisions of this section are not intended to replace or otherwise change the requirements of RCW 39.30.060. If said statute is applicable to this contract then the failure to comply with RCW 39.30.060 will still render a bid non-responsive.

H. The Contractor shall maintain, for at least three years after completion of this contract, relevant records and information necessary to document the level of utilization of MWBEs and other businesses as subcontractors and suppliers in this contract, as well as any efforts the Contractor makes to increase the participation of MWBEs as listed in section I below. The Contractor shall also maintain, for at least three years after completion of this contract, a record of all quotes, bids, estimates, or proposals submitted to the Contractor by all businesses seeking to participate as subcontractors or suppliers in this contract. The state shall have the right to inspect and copy such records. If this contract involves federal funds, Contractor shall comply with all record keeping requirements set forth in any federal rules, regulations, or statutes included or referenced in the contract documents.

I. Bidders should advertise opportunities for subcontractors or suppliers in a manner reasonably designed to provide MWBEs capable of performing the work with timely notice of such opportunities, and all advertisements shall include a provision encouraging participation by MWBE firms. Advertising may be done through general advertisements (e.g. newspapers, journals, etc.) or by soliciting bids directly from MWBEs. Bidders shall provide MWBEs that express interest with adequate and timely information about plans, specifications, and requirements of the contract.

J. Contractors shall not create barriers to open and fair opportunities for all businesses including MWBEs to participate in all State contracts and to obtain or compete for contracts and subcontracts as sources of supplies, equipment, construction and services.

K. Any violation of the mandatory requirements of this part of the contract shall be a material breach of contract for which the Contractor may be subject to a requirement of specific performance, or damages and sanctions provided by contract, by RCW 39.19.090, or by other applicable laws.

10.11 MINIMUM LEVELS OF APPRENTICESHIP PARTICIPATION

In accordance with Executive Order 00-01 the State of Washington may require apprenticeship participation for projects of a certain cost. The bid advertisement and Bid Proposal form shall establish the minimum percentage of apprentice labor hours as compared to the total labor hours.

A. Voluntary workforce diversity goals have been established for the apprentice hours. These goals are that one-fifth (1/5) of the apprentice hours be performed by minorities, and one-sixth (1/6) of the apprentice hours be performed by women.

B. Apprentice participation, under this contract, may be counted towards the required percentage (%) only if the apprentices are from an apprenticeship program registered and approved by the Washington State Apprenticeship and Training Council (RCW 49.04 and WAC 296-04).

C. Bidders may contact the Department of Labor and Industries, Specialty Compliance Services Division, Apprenticeship Section, P.O. Box 44530, Olympia, WA 98504-4530 by phone at (360) 902-5320, and e-mail at Apprentice@Lni.wa.gov, to obtain information on available apprenticeship programs.

D. For each project that has apprentice requirements, the contractor shall submit a "Statement of Apprentice/Journeyman Participation" on forms provided by the Department of General Administration, with every request for progress payment. The Contractor shall submit consolidated and cumulative data collected by the Contractor and collected from all subcontractors by the Contractor. The data to be collected and submitted includes the following:

1. Contractor name and address
2. Contract number
3. Project name
4. Contract value
5. Reporting period "Notice to Proceed" through "Invoicing Date"
6. Craft/trade/occupation of all (contractor and subcontractor trades working on the project) apprentices and journeymen
7. Total number of apprentices and total number of hours worked by apprentices, both categorized by gender and ethnicity
8. Total number of journeymen and total number of hours worked by journeymen, both categorized by gender and ethnicity
9. Cumulative combined total of apprentice and journeymen labor hours.
10. Total percentage of apprentice hours worked
11. No changes to the required percentage (%) of apprentice participation shall be allowed without written approval of the Owner. In any request for the change the Contractor shall clearly demonstrate a good faith effort to comply with the requirements for apprentice participation.
12. Any substantive violation of the mandatory requirements of this part of the contract may be a material breach of the contract by the Contractor. The Owner may withhold payment pursuant to Part 6.05, stop the work for cause pursuant to Part 3.04, and terminate the contract for cause pursuant to Part 9.01.

10.12 HEADINGS AND CAPTIONS

Headings for convenience only: All headings and captions used in these General Conditions are only for convenience of reference and shall not be used in any way in connection with the meaning, effect, interpretation, construction, or enforcement of the General Conditions, and do not define the limit or describe the scope or intent of any provision of these General Conditions.

10.13 SUBCONTRACTOR PAYMENTS REPORTING REQUIREMENTS

This Contract is subject to compliance tracking using the State's business diversity management system, Access Equity (B2Gnow). Access Equity is web-based and can be accessed at the Office of Minority and Women's Business Enterprises at https://omwbe.diversitycompliance.com/. The Contractor and all Subcontractors shall report and confirm receipt of payments made to the Contractor and each Subcontractor through Access Equity.

The Contractor may contact the Owner at contracts@parks.wa.gov for technical assistance in using the Access Equity system. User guides and documentation related to Contractor and Subcontractor access to and use of Access Equity are available online at https://omwbe.wa.gov/access-equity-help-center. The Owner reserves the

right to withhold payments from the Contractor for non-compliance with this section. For purposes of this section, Subcontractor means any subcontractor working on the Contract, at any tier and regardless of status as certified WMBE or Non-WMBE.
The Contractor shall:

a. Register and enter all required Subcontractor information into Access Equity no later than 15 days after the Owner creates the Contract Record.

b. Complete the required user training (two (2) one-hour online sessions) no later than 20 days after the Owner creates the Contract Record.

c. Report the amount and date of all payments (i) received from the Owner, and (ii) paid to Subcontractors, no later than 30 days, issuance of each payment made by the Owner to the Contractor, unless otherwise specified in writing by the Owner, except that the Contractor shall mark as "Final" and report the final Subcontractor payments) into Access Equity no later than thirty (30) days after the final payment is due the Subcontractor(s) under the Contract, with all payment information entered no later than sixty (60) days after end of fiscal year.

d. Monitor contract payments and respond promptly to any requests or instructions from the Owner or system-generated messages to check or provide information in Access Equity.

e. Coordinate with Subcontractors, or Owner when necessary, to resolve promptly any discrepancies between reported and received payments.

f. Require each Subcontractor to: (i) register in Access Equity and complete the required user training; (ii) verify the amount and date of receipt of each payment from the Contractor or a higher tier Subcontractor, if applicable, through Access Equity; (iii) report payments made to any lower tier Subcontractors, if any, in the same manner as specified herein; (iv) respond promptly to any requests or instructions from the Contractor or system-generated messages to check or provide information in Access Equity; and (v) coordinate with Contractor, or Owner when necessary, to resolve promptly any discrepancies between reported and received payments.

END OF CONDITIONS

/ / / / /

Approved as to Form:
William Van Hook /s/
Asst. Attorney General
02/2007
08/2010 GA Updates – jrc
09/2010 to AAG Schwartz

PREVAILING WAGES

Instruction for Prevailing Wage Rates

The State of Washington prevailing wage rates for this public works project, which is located in Pacific County, may be found at the following website address of the Department of Labor and Industries:

https://secure.lni.wa.gov/wagelookup/rates/journey-level-rates

The prevailing wages for this project are those that are in effect on the date that the bids are due.

Contractor to Pay Prevailing Wages

The Contractor shall pay the prevailing rate of wages to all workers, laborers, or mechanics employed in the performance of any part of the Work in accordance with RCW 39.12 and the rules and regulations of the Department of Labor and Industries. The schedule of prevailing wage rates for the locality or localities of the Work is determined by the Industrial Statistician of the Department of Labor and Industries. It is the Contractor's responsibility to verify the applicable prevailing wage rate.

A copy of the applicable wage rates is available upon request. Please request a copy by email at: contracts@parks.wa.gov.

Hazardous Building Materials Survey Report

Cape Disappointment State Park Welcome Center and Explosive Storage Building, 244 Robert Gray Dr, Ilwaco, WA 98624
Contract: SC 325-155

Prepared for

Tim Bell
Washington State Parks and Recreation Commission
Southwest Region Capital Program
1111 Israel Road SW, Tumwater WA 98501
PO Box 42650, Olympia, WA 98504-2650

Prepared by

Terraphase Engineering Inc.
610 SW Broadway, Suite 405
Portland, Oregon 97205

September 18, 2024

Project Number W093.002.001

File: rpt-HBMS-CapeDisapointment-W093-002-001

terraphase engineering

Contents

Acronyms and Abbreviations iii

Signatures iv

1 Introduction 1
- 1.1 Objective 1
- 1.2 Regulatory Compliance 2
  - 1.2.1 Asbestos-Containing Materials 2
  - 1.2.2 Lead Paints 3
  - 1.2.3 Polychlorinated Biphenyls 4

2 Survey, Sampling, and Analysis 4
- 2.1 Asbestos 4
- 2.2 Lead 4
- 2.3 Polychlorinated Biphenyls 5
- 2.4 Bulk Building Materials Disposal Characterization 5
- 2.5 Visual Polychlorinated Biphenyls and Mercury Survey 5

3 Results 5
- 3.1 Asbestos Survey 5
- 3.2 Lead Survey 6
- 3.3 Polychlorinated Biphenyls Survey 6
- 3.4 Bulk Building Materials Sampling 6
- 3.5 Mercury Visual Survey 6

4 Conclusions 7

5 Recommendations 7

6 Limitations 8

7 References 8

Tables

1 Bulk Asbestos Sample Survey Results

2 Bulk Lead Sample Survey Results

3 Bulk PCBs Sample Survey Results

4 Waste Characterization Sample Survey Result

Figures

1 Site Location

2 Welcome Center Building – Asbestos Bulk Sample Location

3 Welcome Center Building – Lead and PCB Sample Location

4 Explosive Storage Building – Hazardous Building Material Sample Locations

Appendices

A Field Log

B Inspector and Management Planner Certifications

C Laboratory Analytical Reports

Acronyms and Abbreviations

ACM	asbestos-containing material
AHERA	Asbestos Hazard Emergency Response Act
CFR	Code of Federal Regulation
Client	Washington State Parks and Recreation Commission
EPA	United States Environmental Protection Agency
HBMS	hazardous building materials survey
LBP	lead-based paint
LCP	lead-containing paint
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NVL	NVL Industrial Hygiene Service
OSHA	Occupational Safety and Health Administrations
PCB	polychlorinated biphenyl
PLM	polarized light microscopy
Site	244 Robert Gray Drive, Ilwaco, WA 98624
TCLP	Toxicity Characteristic Leaching Procedure
Terraphase	Terraphase Engineering Inc.
USHUD	United States Department of Housing and Urban Development
WAC	Washington Administrative Code
WDOE	Washington State Department of Ecology
WSDLI	Washington State Department of Labor and Industries

Signatures

The information, conclusions, and recommendations in this document have been prepared and reviewed by an Asbestos Hazard Emergency Response Act (AHERA) accredited Asbestos Management Planner.



09/18/2024

James R. C. Farrow, RG, LHg
Principal Hydrogeologist
Washington Registered Geologist (2578)

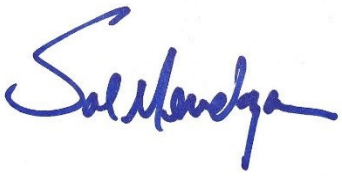
Date



09/18/2024

Aditya Manohar
Staff II Engineer
AHERA-Accredited Inspector (TBI4-224-18913)

Date



09/18/2024

Salvador Mendoza, PG
Associate Geologist
AHERA Management Planner (37858)

Date

1 Introduction

Terraphase Engineering Inc. (Terraphase) was retained by Washington State Parks and Recreation Commission (the Client), to perform a hazardous building material survey (HBMS) to assess for the presence of asbestos-containing materials (ACMs), lead-based paints (LBPs), and polychlorinated biphenyls (PCBs) at the Cape Disappointment State Park Welcome Center and Explosive Storage Building located at 244 Robert Gray Dr, Ilwaco, WA 98624 (the "Site"; Figure 1). Terraphase's HBMS also included a visual assessment for building materials suspected of containing mercury.

The Site is a State Park with the following two building structures that are scheduled to be demolished:

- The Welcome Center building was constructed using wood in 1976, comprising approximately 432 square feet.
- The Former Explosive Storage building is a concrete structure with a metal roof constructed in 1940 comprising approximately 400 square feet.

The HBMS was conducted to inform on construction and disposal constraints that might result from the presence of hazardous building materials. Information was not provided by the Client or other parties regarding historical or known hazardous building material conditions.

Visual inspections, bulk sampling, and survey documentation were conducted on August 09, 2024, by Aditya Manohar, an Asbestos Hazard Emergency Response Act (AHERA) accredited building inspector, and Sidney Carter, of Advantage Environmental Inc., a state of Washington-certified lead-based paint inspector. A layout of the Site is provided on Figures 2a and 2b and photographs taken during the HBMS are provided in Appendix A – Field Log. The analytical results for asbestos were reviewed and interpreted by Salvador Mendoza, an AHERA accredited asbestos management planner, as required by 40 CFR 763.87.[1] AHERA certificates for Messrs. Manohar and Mendoza, and the LBP inspector certification for Mr. Carter, are provided in Appendix B.

This report documents the activities, summarizes the analytical data, and presents the findings of the HBMS.

1.1 Objective

The Client intends to demolish the subject buildings. The HBMS was conducted to identify ACMs, LBP, and PCBs as a pre-demolition screening to inform construction and disposal constraints that might result from the presence of hazardous building materials. The survey included sampling building material for lead analysis, as needed, using the Toxicity Characteristic Leaching Procedure (TCLP) in accordance with the Resource Conservation and Recovery Act (RCRA).

[1] "Analysis," 40 CFR § 763.87, https://www.ecfr.gov/current/title-40/chapter-I/subchapter-R/part-763/subpart-E/section-763.87.

1.2 Regulatory Compliance

The following subsections describe relevant regulatory compliance related to the potential presence of ACMs, LBP, and PCBs. A definition for lead-containing paints (LCPs) is provided in Section 1.2.2.

1.2.1 Asbestos-Containing Materials

The purpose of an asbestos survey is to identify and document the presence or absence of ACMs prior to renovation or demolition activities while maintaining compliance with governing asbestos regulations required by the Washington State Department of Ecology (WDOE) and United States Environmental Protection Agency (EPA). Federal regulations (40 CFR 763.85) require that inspections be conducted by an EPA-accredited building inspector with sample analysis by an asbestos laboratory certified by the National Bureau of Standards.[2] Terraphase's survey of the Site was conducted in compliance with these standards.

AHERA regulation 40 CFR 763 is the primary governing regulation for performing asbestos surveys. The regulation defines suspect asbestos-containing building materials, which contain asbestos in amounts greater than 1 percent, and specifies the minimum number of samples to be collected and analyzed from a "suspect" material. Under current EPA guidelines for conducting building inspections for ACM, all "suspect" materials must be assumed to contain asbestos until otherwise determined by an accredited laboratory. AHERA was originally enacted for required inspections of school buildings by local educational agencies; however, since 1994, it has been applied to public and commercial buildings by the Asbestos School Hazard Abatement Reauthorization Act. The United States Department of Labor Occupational Safety and Health Administrations (OSHA) and Washington State Department of Labor and Industries (WSDLI), specifically, 29 CFR 1926.1101(k),[3] 29 CFR 1910.1001(j),[4] and Washington Administrative Code (WAC) 296-62-07712,[5] have also incorporated AHERA for demolition and renovation projects. The HBMS was conducted consistent with WAC 296-62-07712.

As required by WSDLI and EPA regulations, abatement of ACMs must be conducted by certified asbestos workers under the direct on-site supervision of a certified asbestos supervisor before any remodeling or demolition activities commence. The following EPA National Emission Standards for Hazardous Air Pollutants definitions are utilized throughout this report:

- **Friable ACM** means any material containing more than 1 percent asbestos as determined using the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy"

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[2] "Inspections and re-inspections." 40 CFR § 763.85, https://www.ecfr.gov/current/title-40/chapter-I/subchapter-R/part-763/subpart-E/section-763.85.

[3] Communication of hazards, 29 CFR 1926.1101, https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.1101

[4] Scope and application, 29 CFR 1910.1001, https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1001

[5] Asbestos Requirements, WAC 296-96-07712, https://lni.wa.gov/safety-health/safety-rules/chapter-pdfs/WAC296-62.pdf#WAC_296_62_077

(PLM), that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent, as determined by a method other than point counting by PLM, verify the asbestos content by point counting using PLM.

- **Category I nonfriable ACM** means packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1.
- **Category II nonfriable ACM** means any material, excluding Category I, containing more than 1 percent asbestos, as determined using the methods specified in 40 CFR 763, Subpart E, Appendix E, Section 1, that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.
- **Regulated ACM** means (a) friable asbestos material; (b) Category I that has become friable; (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or (d) Category II that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material during demolition or renovation operations.

1.2.2 Lead Paints

LBP is defined by United States Department of Housing and Urban Development (USHUD) and the EPA as paints containing greater than 0.5 percent and/or 5,000 parts per million (or 5,000 milligrams per kilogram [mg/kg]) lead as analyzed by atomic soil-lead absorption spectrometry and lead greater than 1 milligram per square centimeter as analyzed by x-ray florescence. LCP is defined herein as any amount of lead detected above the laboratory reporting limit in a sample but not meeting the definition of a LBP.

Worker and environmental protection requirements apply to all construction activities that may disturb any LCP/LBP. Precautions must be taken during demolition activities in accordance with Washington State regulations to address worker safety and protection of human health and the environment. Worker exposure, public health, and waste characterization are issues of concern when working with LCP/LBP during building demolition. When workers may be exposed to lead, it is the employer's responsibility to ensure that work practices are in accordance with EPA's Renovation, Repair, and Painting Rule. In addition to this rule, employers should ensure that work practices are in accordance with the United States' OSHA "Lead Standard for the Construction Industry" (29 CFR 1926.62).[6] The property owner(s) should ensure that the public does not have access to the property during demolition activities.

When LCP/LBP is present, bulk building materials require TCLP analysis, and comparison of the results to the TCLP thresholds for hazardous waste, to characterize the material for appropriate disposal following building material removal. The TCLP threshold for lead is 5 milligrams per liter (mg/L).

[6] "Lead." 29 CFR § 1926.62, https://www.ecfr.gov/current/title-29/subtitle-B/chapter-XVII/part-1926/subpart-D/section-1926.62.

1.2.3 Polychlorinated Biphenyls

PCBs are federally regulated hazardous materials. The disposal of PCBs is regulated by EPA under the Toxic Substances Control Act (EPA 2005). Materials with PCB concentrations at or above 50 milligrams per kilogram are considered a PCB bulk product waste and must be disposed in accordance with Toxic Substances Control Act guidelines per 40 CFR 761.[7] EPA requires all PCB bulk product waste to be removed by a certified abatement company once it has been identified. With this report, the PCB screening process would be considered complete for building materials identified as containing <50 ppm PCBs.

2 Survey, Sampling, and Analysis

The HBMS was conducted to identify and evaluate suspect hazardous building materials prior to demolition activities. The HBMS included inspection and sampling of materials in reasonably accessible portions of all building structures and a visual inspection for electrical equipment that may contain mercury and/or PCBs. Limited destructive sampling and testing of accessible suspected ACM and LBP was performed, including limited penetrations through walls, floors, and ceilings, to identify concealed materials. The approximate locations of the hazardous building materials samples are shown on Figure 2.

2.1 Asbestos

The asbestos survey evaluated building materials (flooring, insulation, drywall, etc.) suspected of containing asbestos. To the extent possible, this survey was conducted in accordance with AHERA sampling protocol to meet the requirements of 29 CFR 1926.1101 and 29 CFR 1910.1001. The samples were placed into laboratory-provided airtight bags and submitted to NVL Industrial Hygiene Service (NVL) in Seattle, Washington, under standard chain-of-custody protocols. The samples were analyzed using PLM with dispersion staining in accordance with EPA Methods 600/M4-82-020 and 600/R-93/116. For samples containing more than one separable layer of material, the laboratory report includes findings for each layer separately. Table 1 describes the locations that were sampled.

2.2 Lead

Paint chip samples were collected to assess the lead content in various types of paint observed at the Site. Samples were collected using a clean paint scraper or razor blade and placed in sealed laboratory-provided bags. The samples were submitted to NVL under standard chain-of-custody protocols for lead analysis using atomic absorption by EPA Method 7000B. Table 2 describes the types of paint identified, locations, condition, and lead content (if present) of the paints associated with the Site.

[7] "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," 40 CFR 761, https://www.ecfr.gov/current/title-40/chapter-I/subchapter-R/part-761?toc=1

2.3 Polychlorinated Biphenyls

A PCB survey was conducted to assess the PCB content in the various types of building materials. Samples were placed in sealed laboratory-provided bags and delivered to NVL under standard chain-of-custody protocols for PCB analysis using gas chromatography by EPA Method 8082A. Table 3 describes the PCB bulk sample locations and content (if present).

2.4 Bulk Building Materials Disposal Characterization

Lead was detected in paint samples collected from the Site. Therefore, Terraphase collected one composite sample, from each building, representative of the building materials including paint to be disturbed by planned demolition activities. The sample was delivered to NVL under standard chain-of-custody protocols for lead analysis using TCLP for waste characterization prior to disposal purposes relative to the TCLP hazardous waste threshold for lead.

2.5 Visual Polychlorinated Biphenyls and Mercury Survey

The survey included a visual inspection of light fixtures and other electrical devices that have the potential to contain PCBs or mercury. Thermostats, switches, and electrical devices can contain mercury, while the insulation for these components may contain lead, asbestos, and/or PCBs. Fluorescent and high-intensity discharge lamps and ballasts may also contain PCBs and/or mercury.

3 Results

The analytical results are presented in the following sections.

3.1 Asbestos Survey

Thirty-eight bulk samples were collected for asbestos analysis. The following building materials were reported by the laboratory as containing regulated quantities of asbestos:

- White popcorn ceiling texture (sample WC-24) located in the bathroom was reported by the laboratory as containing 2 percent chrysotile asbestos. The texture was observed to be in good condition, encompasses approximately 100 square feet, and is classified as a regulated ACM. A point count analysis for this sample determined 1.8% asbestos content.
- Black adhesive mastic (sample WC-27) located in the bathroom flooring of the Welcome Center was reported by the laboratory as containing 2 percent chrysotile asbestos. The mastic was observed to be in good condition, encompassing approximately 100 square feet, and is classified as Category II nonfriable ACM. A point count analysis for this sample determined 2.3% asbestos content.

The remaining bulk samples were reported as not containing asbestos. Additional information regarding bulk samples is provided in Table 1, the approximate sample locations are shown on Figures 2a and 3,

and laboratory analytical reports, chain-of-custody forms, and Certificate of Analysis documents are provided in Appendix C.

3.2 Lead Survey

Twelve bulk paint chip samples were collected for lead analysis. Lead was detected above the laboratory reporting limit in five samples:

- Gray exterior paint (sample WCP-PB-002) applied to all exterior wooden walls, in the Welcome Center, was reported by the laboratory as containing 74 mg/kg lead. The paint was observed to be intact and is classified as an LBP.
- Door paint samples (EBP-01 and EBP-003) applied to the metal door frames, in the Explosives Building, were reported by the laboratory as containing 150,000 mg/kg and 81,000 mg/kg lead, on the interior (EBP-001) and exterior surface (EBP-003), respectively. The paint was observed to be in flaking condition and is classified as an LBP.
- Interior and exterior wall paint samples (EBP-002 and EBP-004, respectively) applied to the concrete wall, in the Explosives Building, were reported by the laboratory as containing 50,000 mg/kg and 31,000 mg/kg lead. The paint was observed to be in flaking condition and is classified as an LBP.

Additional information regarding bulk paint chip samples is provided in Table 2 and the approximate sample locations are shown on Figures 2b and 3. Information regarding lead characterization for waste disposal is included in Section 3.4 below.

3.3 Polychlorinated Biphenyls Survey

Three bulk building material samples were collected for PCB analysis. PCB was detected above the laboratory reporting limit in one sample:

- Aroclor – 1260 was detected at a concentration of 1 mg/kg in the wiring within a white wall plug (sample WC-PCB-01) at the Welcome Center Building.

Additional information regarding the PCB samples is provided in Table 3 and the approximate sample location is shown on Figures 2b and 3.

Terraphase did not observe any light ballasts in the on-site buildings.

3.4 Bulk Building Materials Sampling

Lead was not detected above the laboratory reporting limit of 0.5 mg/L in the composite samples from the subject buildings, which is below the TCLP threshold of 5.0 mg/L. Additional information regarding the TCLP analysis is provided in Table 4.

3.5 Mercury Visual Survey

Mercury-containing equipment was not observed within both buildings inspected.

4 Conclusions

The following conclusions are based on visual observations and the analytical results of the samples collected during the HBMS:

- Regulated and nonfriable ACMs were observed in the bathroom at the Welcome Center Building.
- LCP/LBPs were identified on the subject buildings.
- PCBs were detected within electrical wiring at the Welcome Center above the reporting limit but well below the 50 mg/kg that would be considered a PCB bulk product waste.
- PCB-containing light ballasts and mercury-containing equipment were not observed in either building inspected.

5 Recommendations

Based on visual observations and subsequent laboratory analysis of building material samples collected and recorded, ACMs, LBPs, and PCBs are present at the Welcome Center and LBPs are present within the former explosive building. Prior to future demolition work, Terraphase recommends the following:

- A certified abatement contractor properly trained and qualified in accordance with federal, state, and local regulations, as implemented by OSHA, EPA, United States Department of Housing and Urban Development, and WDOE should be retained to perform abatement/remediation of the ACMs, LCPs, and LBPs, as needed, prior to disturbance.
- The LBPs were observed to be damaged at the time of our assessment. Any loose and flaky LCPs/LBPs should be removed and stabilized. Precautions must be taken during demolition activities to address worker safety and protection of human health and the environment in accordance with state of Washington regulations. When workers may be exposed to lead, it is the employer's responsibility to ensure that work practices are in accordance with EPA's Renovation, Repair, and Painting Rule (OHA 2019) and 29 CFR 1926.62. The property owner(s) should ensure that the public does not have access to the property during demolition activities.
- Double-bag and package any removed material for delivery to an appropriate disposal facility in accordance with state of Washington and EPA regulations.
- Provide notification to contractors, subcontractors, and all other individuals having access to the building as to the presence of ACMs, LCPs, and LBPs at the Site.
- Prior to initiating abatement work, the abatement contractor must provide the required ASN-1 and ASN-6 Project Notification forms to WDOE for abatement of friable ACMs and nonfriable asbestos removal, respectively.
- Suspect ACMs, LBPs, and PCBs identified during future activities that are not referenced in this report should be sampled and analyzed by an accredited laboratory to determine if these materials contain asbestos, lead, and/or PCBs.

- Based on the TCLP analytical result, the demolition debris from the Site is not considered hazardous for lead as part of the waste determination.

6 Limitations

This document was prepared for the sole use of the Client, its successors, and assignees for specific application to the building and former building structure located at the Site. This report should be presented to any contractor or subcontractor participating in building renovation and future construction at the Site. No other party should rely on the information contained herein without the prior written consent of Terraphase and the Client.

The opinions and recommendations presented in this report are based upon the scope of services, information obtained through the performance of the services, and the schedule as agreed upon by Terraphase and the Client. The HBMS was designed as a pre-renovation survey of suspect hazardous building materials in reasonably accessible portions of on-site structures. It is possible that other suspect hazardous building materials are present in areas considered inaccessible during this survey, and additional sampling and analysis may be required during renovation prior to waste disposal and or re-use. Therefore, Terraphase does not provide any guarantees, certifications, or warranties (express or implied) that a property is free from hazardous building materials. Furthermore, nothing contained in this document shall relieve any other party of its responsibility to abide by contract documents and all applicable laws, codes, regulations, or standards.

This report was prepared in accordance with the generally accepted standards and level of skill and care under similar conditions and circumstances established by the environmental consulting industry as practiced in Washington. To the extent that Terraphase relied upon any information prepared by other parties not under contract to Terraphase, no representation as to the accuracy or completeness of such information is made. Only the Client may make use of and rely upon the information in this report.

7 References

United States Environmental Protection Agency (EPA). 2005. *Polychlorinated Biphenyl (PCB) Site Revitalization Guidance Under the Toxic Substances Control Act (TSCA).* November. https://www.epa.gov/sites/default/files/2015-08/documents/pcb-guid3-06.pdf.

WAC 365-230-020, https://app.leg.wa.gov/wac/default.aspx?cite=365-230-020

Asbestos Requirements, WAC 296-96-07712, https://lni.wa.gov/safety-health/safety-rules/chapter-pdfs/WAC296-62.pdf#WAC_296_62_077

Tables

1 Bulk Asbestos Sample Survey Results
2 Bulk Lead Sample Survey Results
3 Bulk PCBs Sample Survey Results
4 Waste Characterization Sample Survey Result

Table 1
Bulk Asbestos Sample Survey Results
Cape Disappointment State Park: HBMS Report
244 Robert Gray Dr, Ilwaco WA 98624.

Sample Date: 08.09.2024
NVL Batchh: 2414418.00
2414412.00

HA	Sample ID	Lab ID	Sample Location	Material Description	Asbestos Type and Percent	Condition	Friability	Classification	Estimated Quantity (ft^2)
Welcome Center Building									
1	WC-01	24086472	Exterior - Entrance	Light brown brick pillar with sandy material	ND	Good	NA	NA	NA
1	WC-02	24086473	Exterior - Entrance	Light brown brick pillar with sandy material	ND	Good	NA	NA	NA
1	WC-03	24086474	Exterior - Entrance	Light brown brick pillar with sandy material	ND	Good	NA	NA	NA
2	WC-04	24086475	Exterior - Foundation	Light gray pebble concrete foundation	ND	Good	NA	NA	NA
2	WC-05	24086476	Exterior - Foundation	Light gray pebble concrete foundation	ND	Good	NA	NA	NA
2	WC-06	24086477	Exterior - Foundation	Light gray pebble concrete foundation	ND	Good	NA	NA	NA
3	WC-07	24086478	Exterior - Roof	Black composite roof shingle/black mastic	ND/ND	Good	NA	NA	NA
3	WC-08	24086479	Exterior - Roof	Black composite roof shingle/black mastic	ND/ND	Good	NA	NA	NA
3	WC-09	24086480	Exterior - Roof	Black composite roof shingle/black mastic	ND/ND	Good	NA	NA	NA
4	WC-10	24086481	Exterior - Column	Gray exterior wooden column	ND	Good	NA	NA	NA
4	WC-11	24086482	Exterior - Column	Gray exterior wooden column	ND	Good	NA	NA	NA
5	WC-12	24086483	Exterior - Wall	Light blue exterior wall	ND	Good	NA	NA	NA
5	WC-13	24086484	Exterior - Wall	Light blue exterior wall	ND	Good	NA	NA	NA
5	WC-14	24086485	Exterior - Wall	Light blue exterior wall	ND	Good	NA	NA	NA
6	WC-15	24086486	Exterior - Pipe Insulation	Black exterior air conditioning pipe insulation	ND	Good	NA	NA	NA
6	WC-16	24086487	Exterior - Pipe Insulation	Black exterior air conditioning pipe insulation	ND	Good	NA	NA	NA
7	WC-17	24086488	Interior - Wall	Cream drywall/white plaster/red cotton insulation	ND/ND/ND	Good	NA	NA	NA
7	WC-18	24086489	Interior - Wall	Cream drywall/white plaster/red cotton insulation/silver aluminum insulation	ND/ND/ND/ND	Good	NA	NA	NA
7	WC-19	24086490	Interior - Wall	Cream drywall/white plaster/red cotton insulation/silver aluminum insulation	ND/ND/ND/ND	Good	NA	NA	NA
8	WC-20	24086491	Interior - Ceiling	White popcorn ceiling/white plaster/red cotton insulation	ND/ND/ND	Good	NA	NA	NA
8	WC-21	24086492	Interior - Ceiling	White popcorn ceiling/white plaster/red cotton insulation/silver aluminum insulation	ND/ND/ND/ND	Good	NA	NA	NA
8	WC-22	24086493	Interior - Ceiling	White popcorn ceiling/white plaster/tan paper/red cotton insulation/silver aluminum insulation	ND/ND/ND/ND/ND/ND	Good	NA	NA	NA
9	WC-23	24086494	Interior - Wall	White foamy hole plug/yellow foamy hole plug	ND/ND	Good	NA	NA	NA
10	WC-24	24086495	Interior - Ceiling	**White bathroom popcorn ceiling**/white plaster/red cotton insulation/silver aluminum insulation	**2% Chrysotile**/ND/ND/ND	**Good**	**NA**	**RACM**	**100**
10	WC-25	24086496	Interior - Ceiling	White bathroom popcorn ceiling/white plaster/red cotton insulation/silver aluminum insulation	ND/ND/ND/ND	Good	NA	NA	NA
11	WC-26	24086497	Interior - Floor	Off-white bathroom sheet vinyl/beige mastic/tan adhesive/gray tile	ND/ND/ND/ND	Good	NA	NA	NA
11	WC-27	24086498	Interior - Floor	Off-white bathroom sheet vinyl/beige mastic/tan adhesive/gray tile/**black mastic**	ND/ND/ND/ND/**Chrysotile 2%**	**Good**	**Nonfriable**	**Category II**	**100**
12	WC-28	24086499	Interior - Wall	Acoustic insulation	ND	Good	NA	NA	NA
12	WC-29	24086500	Interior - Wall	Acoustic insulation	ND	Good	NA	NA	NA

Table 1
Bulk Asbestos Sample Survey Results
Cape Disappointment State Park: HBMS Report
244 Robert Gray Dr, Ilwaco WA 98624.

Sample Date: 08.09.2024
NVL Batchh: 2414418.00
2414412.00

HA	Sample ID	Lab ID	Sample Location	Material Description	Asbestos Type and Percent	Condition	Friability	Classification	Estimated Quantity (ft^2)
Explosives Storage Building									
1	EB-01	24086454	Interior - Door	Green metallic door paint	ND	Good	NA	NA	NA
2	EB-02	24086455	Exterior - Door	Black metallic door paint	ND	Good	NA	NA	NA
3	EB-03	24086456	Interior - Wall	White concrete wall	ND	Good	NA	NA	NA
3	EB-04	24086457	Interior - Wall	White concrete wall	ND	Good	NA	NA	NA
3	EB-05	24086458	Exterior - Wall	White concrete wall	ND	Good	NA	NA	NA
4	EB-06	24086459	Interior	White coating/black coating/white woven mesh/tan fibrous material/black asphaltic material/silver paint	ND/ND/ND/ND/ND/ND	Good	NA	NA	NA
5	EB-07	24086460	Interior - Floor	Wooden floor panel	ND	Good	NA	NA	NA
5	EB-08	24086461	Interior - Floor	Wooden floor panel	ND	Good	NA	NA	NA

Note:
Bold and Red = asbestos detected
ft^2 = square feet
HA = Homogeneous asbestos
NA = not applicable
ND = None detect
RACM = Regulated asbestos containing material

Table 2
Bulk Lead Sample Survey Results
Cape Disappointment State Park - HBMS
244 Robert Gray Dr, Ilwaco, WA 98624

Sample Date: 08.09.2024
NVL Batch: 2414423.00
2414413.00

Sample ID	Lab ID	Sample Location	Material Description/Extent	Substrate	Condition	Lead Content (mg/kg)	Classification
Welcome Center Building							
WCP-001	24086509	Exterior - Wall	Dark gray wood paint	Wood	Flaking	<51	NA
WCP-002	24086510	Exterior - Wall	Gray wood paint	Wood	Intact	**74**	**LCP**
WCP-003	24086511	Exterior - Door	Dark gray door paint	Wood	Flaking	<52	NA
WCP-004	24086512	Interior - Wall	Salmon wall paint	Drywall/Plaster	Intact	<49	NA
WCP-005	24086513	Interior - Ceiling	White ceiling paint	Wood	Intact	<42	NA
WCP-006	24086514	Interior - Wall	Brown wall paint	Drywall/Plaster	Intact	<41	NA
WCP-007	24086515	Interior - Wall	Salmon bathroom wall paint	Drywall/Plaster	Intact	<45	NA
Explosives Storage Building							
EBP-001	24086462	Interior - Door	Green metallic paint	Metal	Flaking	**150,000**	**LBP**
EBP-002	24086463	Interior - Wall	White wall paint	Concrete	Flaking	**50,000**	**LBP**
EBP-003	24086464	Exterior - Door	Black metallic paint	Metal	Flaking	**81,000**	**LBP**
EBP-004	24086465	Exterior - Wall	White wall paint	Concrete	Intact	**31,000**	**LBP**
EBP-005	24086466	Interior - Floor	White floor paint	Concrete	Flaking	<55	NA

Note:
' < ' = Below Reporting Limit
Bold and red color = indicate lead detected in sample
LCP = Lead-containing paint
LBP = Lead-based paint
mg/kg = milligram per kilogram
NA = Not Applicable

Table 3
Bulk PCBs Sample Survey Results
Cape Disappointment State Park - HBMS
244 Robert Gray Dr, Ilwaco, WA 98624

Sample Dates: 08.09.2024
Batch: 2414420.00
2414417.00

Sample Name	Lab ID	Compounds Analyzed	Sample Location	Material Description/Extent	PCB Content (mg/kg)
Welcome Center Building					
WC-PCB-01	24086503	Aroclor - 1016	Interior wall - Reception	White wall plug and insulation	<0.84
		Aroclor - 1221			<0.84
		Aroclor - 1232			<0.84
		Aroclor - 1242			<0.84
		Aroclor - 1248			<0.84
		Aroclor - 1254			<0.84
		Aroclor - 1260			**1.0**
Explosives Storage Building					
EB-PCB-01	24086470	Aroclor - 1016	Interior wall - Reception	White wall plug and insulation	<0.98
		Aroclor - 1221			<0.98
		Aroclor - 1232			<0.98
		Aroclor - 1242			<0.98
		Aroclor - 1248			<0.98
		Aroclor - 1254			<0.98
		Aroclor - 1260			<0.98
EB-PCB-02	2414417	Aroclor - 1016	Interior wall - Reception	White wall plug and insulation	<0.97
		Aroclor - 1221			<0.97
		Aroclor - 1232			<0.97
		Aroclor - 1242			<0.97
		Aroclor - 1248			<0.97
		Aroclor - 1254			<0.97
		Aroclor - 1260			<0.97

Note:
' < ' = Less than
mg/kg = milligrams per kilogram
Bold and red color = indicate PCBs detected in sample

Table 4
Waste Characterization Sample Survey Result
Cape Disappointment State Park - HBMS
244 Robert Gray Dr, Ilwaco, WA 98624

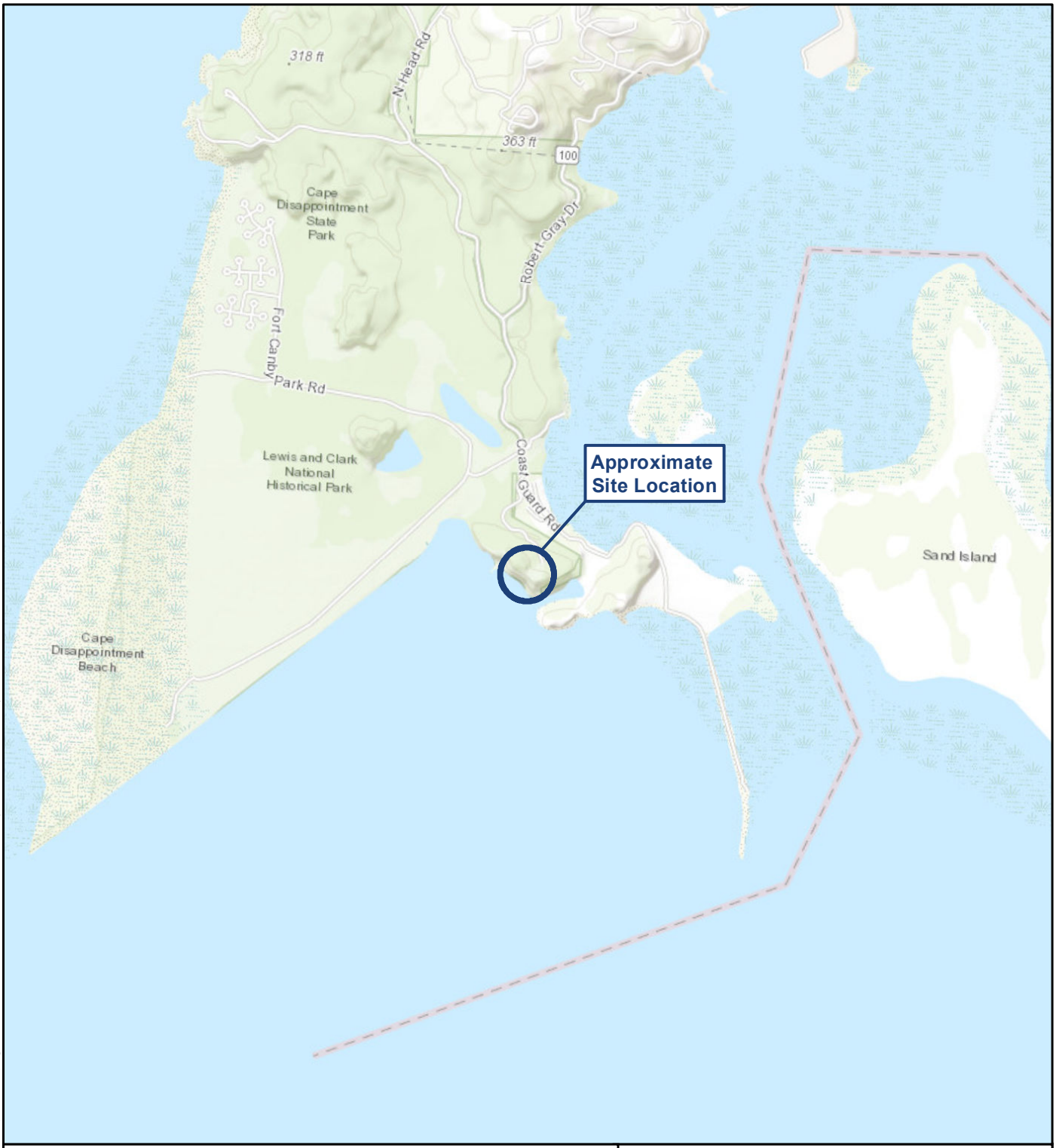
Sample Date: 08.09.2024
NVL Batch: 2414891.00
2414893.00

Sample Name	Lab ID	Sample Location[1]	TCLP Lead Result (mg/L)	TCLP Regulatory Level[2] (mg/L)
WC-TCLP	24089187	Composite Welcome Center Sample	**<0.5**	5.0
EB-TCLP	24089189	Composite Explosives Building Sample	**<0.5**	5.0

Note:
[1] Sample represents a composite of typical interior and exterior building materials associated with the Site.
[2] TCLP Regulatory Level based on Title 40 CFR 261.24 - Toxicity Characteristic.
mg/L = milligrams per liter
TCLP = Toxicity Characteristic Leaching Procedure

Figures

1 Site Location
2 Welcome Center Building – Asbestos Bulk Sample Location
3 Welcome Center Building – Lead and PCB Sample Location
4 Explosive Storage Building – Hazardous Building Material Sample Location



0 1,250 2,500 3,750 5,000 Feet

1 inch = 2,500 feet

N

Legend

Approximate Site Location

Base Map: ESRI World Topographic Map
(data providers include HERE, Garmin, USGS, et al.)

SAFETY FIRST

terraphase engineering

CLIENT: WA State Parks

PROJECT: Cape Disappointment State Park
244 Robert Gray Dr, Ilwaco WA 98624

PROJECT NUMBER: W093.001.001

Site Location

FIGURE 1

File: N:\GIS\Prj\W093.001_Cape Disappointment State Park\MXDs\(20240813) Figure 1 - Site Location.mxd 8/13/2024 Created by: S.Lowe Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet



Aerial Imagery Source: Nearmap (June 2, 2023)

0 4 8 12 16 Feet

1 inch = 8 feet

N

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CLIENT:	WA State Parks
PROJECT:	Cape Disappointment State Park 244 Robert Gray Dr, Ilwaco WA 98624
PROJECT NUMBER:	W093.001.001

Welcome Center – Asbestos Bulk Sample location

FIGURE 2A

File: N:\GIS\Prj\W093.001_Cape Disappointment State Park\MXDs\(20240813) Figure 2A - Welcome Center – Asbestos Bulk Sample location.mxd 9/3/2024 Created by: S.Lowe Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet



Legend

- Approximate Lead Paint Chip Sample Location
- Approximate Polychlorinated Biphenyls (PCB) Bulk Sample Location
- Approximate Brick Pavers and Pillar Outline
- Approximate Building Outline
- Approximate Pebble Concrete Foundation Outline

Aerial Imagery Source: Nearmap (June 2, 2023)

0 4 8 12 16 Feet

1 inch = 8 feet

N

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terraphase engineering

CLIENT: WA State Parks

PROJECT: Cape Disappointment State Park
244 Robert Gray Dr, Ilwaco WA 98624

PROJECT NUMBER: W093.001.001

**Welcome Center –
Lead and PCB Sample location**

FIGURE 2B

File: N:\GIS\Prj\W093.001_Cape Disappointment State Park\MXDs\(20240813) Figure 2B - Welcome Center – Lead and PCB Sample location.mxd 9/3/2024 Created by: S.Lowe Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet



Legend

- Approximate Asbestos Bulk Sample Location
- Approximate Lead Paint Chip Sample Location
- Approximate Polychlorinated Biphenyls (PCB) Bulk Sample Location
- Approximate Building Outline

Aerial Imagery Source: Nearmap (June 2, 2023)

0 3 6 9 12 Feet

1 inch = 6 feet

N

SAFETY FIRST

terraphase engineering

CLIENT:	WA State Parks
PROJECT:	Cape Disappointment State Park 244 Robert Gray Dr, Ilwaco WA 98624
PROJECT NUMBER:	W093.001.001

Explosive Storage Building - Hazardous Building Material Sample Locations

FIGURE 3

File: N:\GIS\Prj\W093.001_Cape Disappointment State Park\MXDs\(20240813) Figure 3 - Explosives Building – Hazardous Building Material Samples.mxd 9/3/2024 Created by: S.Lowe Coordinate System: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Appendix A

Field Log

Daily Field Log

Date: 08-09-2024	Day of the Week: Friday	Logged by: Aditya Manohar
Project Name: HBMS – Cape Disappointment State Park		Project Number: W093.001.001
Site Location: 244 Robert Gray Dr, Ilwaco, WA 98624.		
Weather Conditions: Partly Sunny (55 – 65^0 F)		
Personnel present on site: Aditya Manohar (Terraphase Engineering), and Sid Carter (Advantage Environmental Inc.)		

Time	Notes
0900	Terraphase arrives on Site, checks in at Welcome Center. JSA review and acceptance. Daily Tailgate meeting.
0930	Start survey the Welcome Center and Explosive Building.
1000	Welcome Center:



View facing West (Entrance)



View facing South



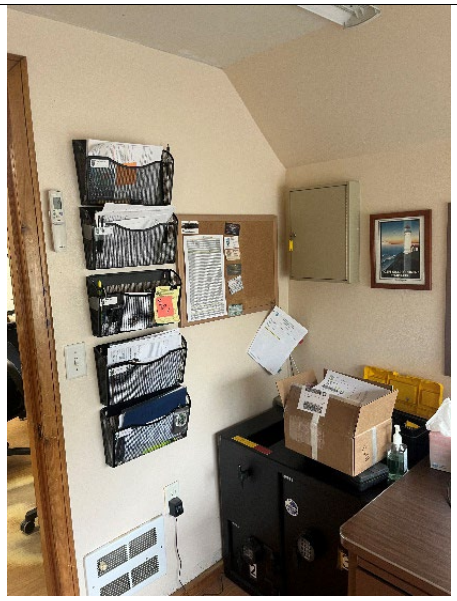
View facing North



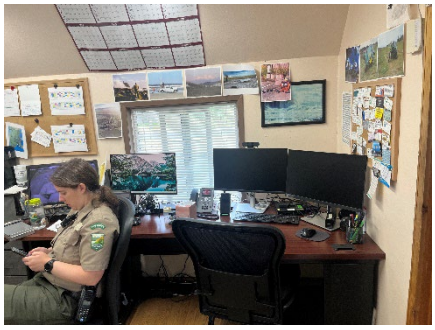
View facing East (Back-Entrance)



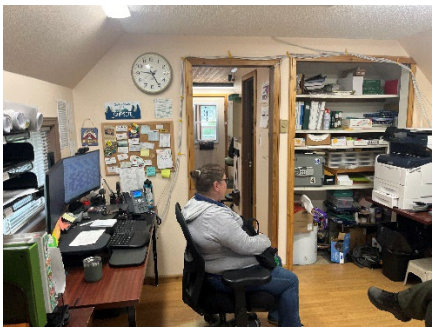
Private Office Space



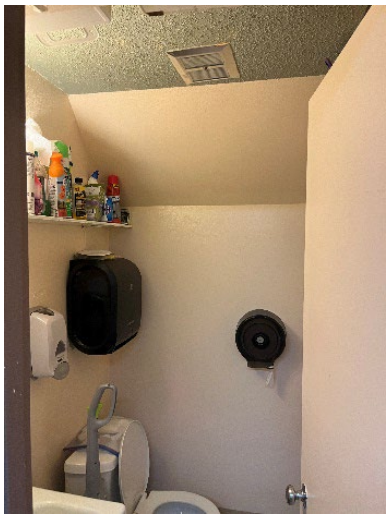
Private Office Space



Coworking Office Space



Coworking Office Space



Restroom

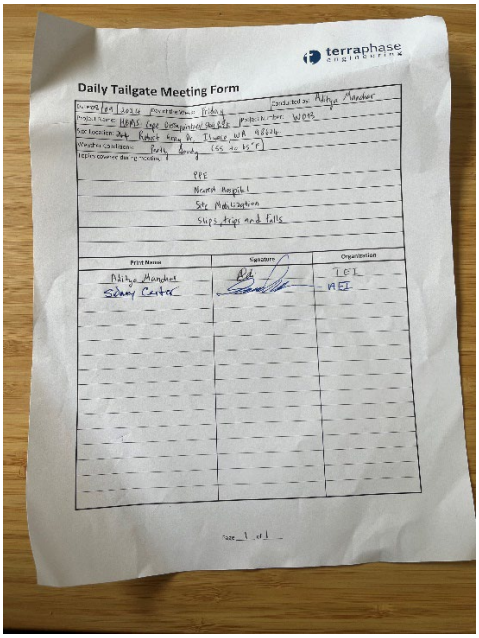


Reception

	 Lobby
1030	Explosives Building:  View facing North (Entrance)  View facing West  View facing South  View facing East

	 Interior View of Explosive Building
1100	Terraphase begins collecting Asbestos and PCB samples.  WC-003 (Brick Pillar)  WC-007 (Roof Composite Shingle Sample)

	 WC-021 (Popcorn Sprayed-on Ceiling)  WC-026 and WC-027 (Sheet Vinyl Floor)  WC-PCB-01 (Wiring Insulation/Wall Plug)
1200	Advantage Environmental arrive on Site and checks in with Terraphase regarding scope and Health and Safety..

	
1230	Advantage begin collecting Paint Chip samples.
1400	Advantage departs Site after collecting Lead samples at Welcome Center and Explosives Building.
1415	Terraphase continues to collect Asbestos and PCB samples.  EB-04 (Concrete Wall)  EB-PBC-01 and EB-PCB-02 (Wiring Insulation)
1500	QA/QCs collected samples.

1530	Departs Site.
1630	Samples submitted to NVL labs.

Appendix B

Inspector and Management Planner Certifications

STATE OF WASHINGTON

Department of Commerce

Lead-Based Paint Abatement Program

Sidney Wayne Carter

Has fulfilled the certification requirements of WAC 365-230 and has been certified to conduct lead-based paint activities as a

Risk Assessor

Certification #	Issuance Date	Expiration Date
7376	09/14/2021	09/12/2024

SATORI GROUP

1310 E 66th Avenue, Suite 2- Anchorage, AK 99518 - 907.332.0456

Satori Group, Inc. 23rd ANNIVERSARY 2001-2024

Certificate of Training

This is to certify that

Aditya Manohar

Has Attended and Successfully Completed

Building Inspector Refresher
4 Hour Course

This course is fully accredited by the Alabama Department of Environmental Management (ADEM) in compliance with TSCA Title II. This course is a synchronous and online course.

Certificate Number: TBI4-224-18913

Expiration Date: 2/8/2025

Alan Caldwell
Principal Instructor

2/8/2024
Exam Date:

2/8/2024
Course Date:

Certificate of Training

This Certifies that

Sal Mendoza

has successfully completed 4 hours training entitled

Asbestos Management Planner Refresher

Toxic Substances Control Act, Title II (AHERA)

This is an annual certification. It must be renewed.

Environmental
Safety
Training
Professionals Ltd.

3140 Gold Camp Drive #130
Rancho Cordova, CA 95670
Phone 916 638-5550
Fax 916 638-5551
Division Approval #CA-006-08

I.D. #: 9676
Certification #: 37858
Course Date: 03/07/24

Expiration Date: 03/07/25

By _____
Authorized Signature: Brandy Snider

Appendix C

Laboratory Analytical Reports

August 19, 2024

NVL
INDUSTRIAL HYGIENE SERVICES
LABORATORY + MANAGEMENT + TRAINING

James Farrow
Terraphase Engineering Inc
610 SW Broadway, Ste. 407
Portland, OR 97205

RE: Bulk Asbestos Fiber Analysis; NVL Batch # 2414418.00

Client Project: W093
Location: 244 Robert Gray Dr Ilwaco, WA

Dear Mr. Farrow,

Enclosed please find test results for the 29 sample(s) submitted to our laboratory for analysis on 8/12/2024.

Examination of these samples was conducted for the presence of identifiable asbestos fibers using polarized light microscopy (PLM) with dispersion staining in accordance with **U. S. EPA 40 CFR Appendix E to Subpart E of Part 763**, Interim Method for the Determination of Asbestos in Bulk Insulation Samples and **EPA 600/R-93/116**, Method for the Determination of Asbestos in Bulk Building Materials.

For samples containing more than one separable layer of materials, the report will include findings for each layer (labeled Layer 1 and Layer 2, etc. for each individual layer). The asbestos concentration in the sample is determined by calibrated visual estimation.

For those samples with asbestos concentrations between 1 and 10 percent based on visual estimation, the EPA recommends a procedure known as point counting (NESHAPS, 40 CFR Part 61). Point counting is a statistically more accurate means of quantification for samples with low concentrations of asbestos.

The detection limit for the calibrated visual estimation is <1%, 400 point counts is 0.25% and 1000 point counts is 0.1%

Samples are archived for two weeks following analysis. Samples that are not retrieved by the client are discarded after two weeks.

Thank you for using our laboratory services. Please do not hesitate to call if there is anything further we can assist you with.

Sincerely,

Hilary Crumley, Manager Asbestos Laboratory

NVLAP
Testing
Lab Code: 102063-0

Enc.: Sample Results

Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)
4708 Aurora Avenue North | Seattle, WA 98103-6516

Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2414418.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 29
Samples Analyzed: 29
Method: EPA/600/R-93/116

Lab ID: 24086472 **Client Sample #: WC-001**

Layer 1 of 1 **Description:** Light brown crumbly and loose sandy material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Concrete/Binder, Fine particles, Fine grains	Cellulose <1%	**None Detected ND**
Mineral grains, Brick		

Lab ID: 24086473 **Client Sample #: WC-002**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Light brown crumbly and loose sandy material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Concrete/Binder, Fine particles, Fine grains	Cellulose 1%	**None Detected ND**
Mineral grains, Brick		

Lab ID: 24086474 **Client Sample #: WC-003**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Light brown crumbly and loose sandy material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Concrete/Binder, Fine particles, Fine grains	Cellulose <1%	**None Detected ND**
Mineral grains, Brick		

Lab ID: 24086475 **Client Sample #: WC-004**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Light gray crumbly sandy material with debris

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Fine particles, Fine grains	None Detected ND	**None Detected ND**
Mineral grains, Gravel, Debris		

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

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Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: Mr. James Farrow
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2414418.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 29
Samples Analyzed: 29
Method: EPA/600/R-93/116

Lab ID: 24086476 **Client Sample #: WC-005**
Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Light gray crumbly sandy material with debris

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Fine particles, Fine grains	Cellulose 3%	**None Detected ND**
Mineral grains, Gravel, Organic debris		

Lab ID: 24086477 **Client Sample #: WC-006**
Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Light gray crumbly sandy material with debris

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Fine particles, Fine grains	Cellulose 5%	**None Detected ND**
Mineral grains, Gravel, Organic debris		

Lab ID: 24086478 **Client Sample #: WC-007**
Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 2 **Description:** Multi-layered black asphaltic material with granules

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Asphalt/Binder, Asphaltic Particles, Fine grains	Glass fibers 68%	**None Detected ND**
Granules		

Layer 2 of 2 **Description:** Black asphaltic mastic

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Mastic/Binder, Asphaltic Particles	Cellulose 1%	**None Detected ND**

Lab ID: 24086479 **Client Sample #: WC-008**
Location: 244 Robert Gray Dr Ilwaco, WA

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

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Batch #: 2414418.00
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Date Received: 8/12/2024
Samples Received: 29
Samples Analyzed: 29
Method: EPA/600/R-93/116

Layer 1 of 2 **Description:** Black asphaltic material with granules

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Asphalt/Binder, Asphaltic Particles, Fine grains	Glass fibers 61%	**None Detected ND**
Granules		

Layer 2 of 2 **Description:** Black asphaltic mastic

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Mastic/Binder, Asphaltic Particles	None Detected ND	**None Detected ND**

Lab ID: 24086480 **Client Sample #: WC-009**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 2 **Description:** Multi-layered black asphaltic material with granules

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Asphalt/Binder, Asphaltic Particles, Fine grains	Glass fibers 65%	**None Detected ND**
Granules		

Layer 2 of 2 **Description:** Black asphaltic mastic with granules

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Mastic/Binder, Asphaltic Particles, Granules	Cellulose <1%	**None Detected ND**

Lab ID: 24086481 **Client Sample #: WC-010**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Thin layer tan crumbly compressed wood pieces with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint, Binder/Filler, Wood	Cellulose 76%	**None Detected ND**

Lab ID: 24086482 **Client Sample #: WC-011**

Location: 244 Robert Gray Dr Ilwaco, WA

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

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Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2414418.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 29
Samples Analyzed: 29
Method: EPA/600/R-93/116

Layer 1 of 1 **Description:** Thin layer tan crumbly compressed wood pieces with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint, Binder/Filler, Wood	Cellulose 81%	**None Detected ND**

Lab ID: 24086483 **Client Sample #: WC-012**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Beige crumbly compressed material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint, Binder/Filler, Fine particles	Cellulose 36%	**None Detected ND**

Lab ID: 24086484 **Client Sample #: WC-013**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Beige crumbly compressed material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint, Binder/Filler, Fine particles	Cellulose 41%	**None Detected ND**

Lab ID: 24086485 **Client Sample #: WC-014**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Beige crumbly compressed material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint, Binder/Filler, Fine particles	Cellulose 45%	**None Detected ND**

Lab ID: 24086486 **Client Sample #: WC-015**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Black crumbly foamy material with fibrous debris

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Synthetic foam, Debris	Cellulose <1%	**None Detected ND**

Lab ID: 24086487 **Client Sample #: WC-016**

Location: 244 Robert Gray Dr Ilwaco, WA

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

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Bulk Asbestos Fibers Analysis

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Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2414418.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 29
Samples Analyzed: 29
Method: EPA/600/R-93/116

Layer 1 of 1 **Description:** Black crumbly foamy material with fibrous and paint debris

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint, Binder/Filler, Fine particles	Cellulose 4%	**None Detected ND**
Synthetic foam, Debris		

Lab ID: 24086488 **Client Sample #: WC-017**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 3 **Description:** Thin layer of white compacted powdery material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint, Calcareous binder, Calcareous particles	Cellulose 1%	**None Detected ND**

Layer 2 of 3 **Description:** White crumbly chalky material with paper

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Gypsum/Binder, Fine particles, Fine grains	Cellulose 25%	**None Detected ND**

Layer 3 of 3 **Description:** Pink fibrous material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Fine particles	Glass fibers 39%	**None Detected ND**

Lab ID: 24086489 **Client Sample #: WC-018**

Location: 244 Robert Gray Dr Ilwaco, WA

Comments: Unsure of correct layer sequence.

Layer 1 of 4 **Description:** Thin layer of white compacted powdery material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint, Calcareous binder, Calcareous particles	None Detected ND	**None Detected ND**

Layer 2 of 4 **Description:** White crumbly chalky material with paper

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Gypsum/Binder, Fine particles, Fine grains	Cellulose 23%	**None Detected ND**

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

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Bulk Asbestos Fibers Analysis

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Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2414418.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 29
Samples Analyzed: 29
Method: EPA/600/R-93/116

Layer 3 of 4	**Description:** Tan crumbly paper with asphalt and silver foil			
	Non-Fibrous Materials:	Other Fibrous Materials:%		**Asbestos Type: %**
	Binder/Filler, Asphaltic Particles, Metal foil	Cellulose	37%	**None Detected ND**
Layer 4 of 4	**Description:** Pink fibrous material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		**Asbestos Type: %**
	Binder/Filler, Fine particles	Glass fibers	72%	**None Detected ND**

Lab ID: 24086490 **Client Sample #: WC-019**

Location: 244 Robert Gray Dr Ilwaco, WA

Comments: Unsure of correct layer sequence.

Layer 1 of 4	**Description:** Thin layer of white compacted powdery material with paint			
	Non-Fibrous Materials:	Other Fibrous Materials:%		**Asbestos Type: %**
	Paint, Calcareous binder, Calcareous particles	None Detected	ND	**None Detected ND**
Layer 2 of 4	**Description:** White crumbly chalky material with paper			
	Non-Fibrous Materials:	Other Fibrous Materials:%		**Asbestos Type: %**
	Gypsum/Binder, Fine particles, Fine grains	Cellulose	21%	**None Detected ND**
Layer 3 of 4	**Description:** Tan crumbly paper with asphalt and silver foil in debris			
	Non-Fibrous Materials:	Other Fibrous Materials:%		**Asbestos Type: %**
	Binder/Filler, Asphaltic Particles, Metal foil	Cellulose	29%	**None Detected ND**
	Debris			
Layer 4 of 4	**Description:** Pink fibrous material			
	Non-Fibrous Materials:	Other Fibrous Materials:%		**Asbestos Type: %**
	Binder/Filler, Fine particles	Glass fibers	79%	**None Detected ND**

Lab ID: 24086491 **Client Sample #: WC-020**

Location: 244 Robert Gray Dr Ilwaco, WA

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

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Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

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Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: Mr. James Farrow
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2414418.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 29
Samples Analyzed: 29
Method: EPA/600/R-93/116

Layer 1 of 3	**Description:** White lumpy foamy material with paint			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Paint, Calcareous binder, Calcareous particles	Glass fibers	1%	**None Detected ND**
	Fine grains, Synthetic foam	Cellulose	<1%	
Layer 2 of 3	**Description:** White crumbly and loose chalky material with paper			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Gypsum/Binder, Fine particles, Fine grains	Cellulose	23%	**None Detected ND**
Layer 3 of 3	**Description:** Pink fibrous material with silver foil in debris			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Binder/Filler, Fine particles, Metal foil	Glass fibers	46%	**None Detected ND**

Lab ID: 24086492 **Client Sample #: WC-021**

Location: 244 Robert Gray Dr Ilwaco, WA

Comments: Unsure of correct layer sequence.

Layer 1 of 4	**Description:** White lumpy foamy material with paint			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Paint, Calcareous binder, Calcareous particles	Glass fibers	2%	**None Detected ND**
	Fine grains, Synthetic foam	None Detected	ND	
Layer 2 of 4	**Description:** White crumbly and loose chalky material with paper			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Gypsum/Binder, Fine particles, Fine grains	Cellulose	19%	**None Detected ND**
Layer 3 of 4	**Description:** Tan paper with asphalt and silver foil			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Binder/Filler, Fine particles, Metal foil	Cellulose	17%	**None Detected ND**

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

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Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2414418.00
Client Project #: W093
Date Received: 8/12/2024
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Method: EPA/600/R-93/116

Layer 4 of 4 **Description:** Light yellow fibrous material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Fine particles	Glass fibers 12%	**None Detected ND**

Lab ID: 24086493 **Client Sample #: WC-022**

Location: 244 Robert Gray Dr Ilwaco, WA

Comments: Unsure of correct layer sequence.

Layer 1 of 5 **Description:** White lumpy foamy material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint, Calcareous binder, Calcareous particles	Glass fibers 1%	**None Detected ND**
Fine grains, Synthetic foam	Cellulose <1%	

Layer 2 of 5 **Description:** White crumbly and loose chalky material with paper

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Gypsum/Binder, Fine particles, Fine grains	Cellulose 18%	**None Detected ND**

Layer 3 of 5 **Description:** Tan paper with asphalt and silver foil in debris

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Fine particles, Metal foil	Cellulose 25%	**None Detected ND**

Layer 4 of 5 **Description:** Pink fibrous material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Fine particles	Glass fibers 46%	**None Detected ND**

Layer 5 of 5 **Description:** Light yellow fibrous material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Fine particles	Glass fibers 13%	**None Detected ND**

Lab ID: 24086494 **Client Sample #: WC-023**

Location: 244 Robert Gray Dr Ilwaco, WA

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

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Method: EPA/600/R-93/116

Layer 1 of 2	**Description:** White lumpy foamy material with paint			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Paint, Calcareous binder, Calcareous particles	Glass fibers	<1%	**None Detected ND**
	Fine grains, Synthetic foam	None Detected	ND	
Layer 2 of 2	**Description:** Yellow crumbly foamy material with tan adhesive			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Adhesive/Binder, Synthetic foam	None Detected	ND	**None Detected ND**

Lab ID: 24086495 **Client Sample #: WC-024**
Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 4	**Description:** White compacted powdery material with paint			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Paint, Calcareous binder, Calcareous particles	Cellulose	2%	**Chrysotile 2%**
	Fine grains			
Layer 2 of 4	**Description:** White crumbly and loose chalky material with paper			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Gypsum/Binder, Fine particles, Fine grains	Cellulose	24%	**None Detected ND**
Layer 3 of 4	**Description:** Tan paper with asphalt and silver foil			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Binder/Filler, Asphaltic Particles, Metal foil	Cellulose	19%	**None Detected ND**
Layer 4 of 4	**Description:** Pink fibrous material			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Binder/Filler, Fine particles	Glass fibers	35%	**None Detected ND**

Lab ID: 24086496 **Client Sample #: WC-025**
Location: 244 Robert Gray Dr Ilwaco, WA

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

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Method: EPA/600/R-93/116

Layer 1 of 4	**Description:** White compacted powdery material with paint			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Paint, Calcareous binder, Calcareous particles	Cellulose	1%	**None Detected ND**
	Fine grains			
Layer 2 of 4	**Description:** White crumbly and loose chalky material with paper			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Binder/Filler, Fine particles, Fine grains	Cellulose	26%	**None Detected ND**
Layer 3 of 4	**Description:** Tan crumbly paper with asphalt and silver foil			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Binder/Filler, Asphaltic Particles, Metal foil	Cellulose	33%	**None Detected ND**
Layer 4 of 4	**Description:** Pink fibrous material			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Binder/Filler, Fine particles	Glass fibers	39%	**None Detected ND**

Lab ID: 24086497 **Client Sample #: WC-026**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 4	**Description:** Off-white sheet vinyl			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Vinyl/Binder, Fine particles, Synthetic foam	None Detected	ND	**None Detected ND**
Layer 2 of 4	**Description:** Beige crumbly backing with mastic			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Mastic/Binder, Fine particles	Cellulose	18%	**None Detected ND**
		Glass fibers	11%	
Layer 3 of 4	**Description:** Tan adhesive with debris			
	Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
	Adhesive/Binder, Fine grains, Fine particles	Cellulose	7%	**None Detected ND**

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government

Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2414418.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 29
Samples Analyzed: 29
Method: EPA/600/R-93/116

Debris

Layer 4 of 4 **Description:** Thin layer of light gray vinyl tile

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Vinyl/Binder, Fine grains, Fine particles	Cellulose 1%	**None Detected ND**

Lab ID: 24086498 **Client Sample #: WC-027**

Location: 244 Robert Gray Dr Ilwaco, WA

Comments: Insufficient black asphaltic mastic for analysis in layer-5

Layer 1 of 5 **Description:** Off-white sheet vinyl

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Vinyl/Binder, Fine particles, Synthetic foam	None Detected ND	**None Detected ND**

Layer 2 of 5 **Description:** Beige crumbly backing with mastic

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Mastic/Binder, Fine particles	Cellulose 21%	**None Detected ND**
	Glass fibers 13%	

Layer 3 of 5 **Description:** Tan adhesive

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Adhesive/Binder, Fine grains	Cellulose 1%	**None Detected ND**

Layer 4 of 5 **Description:** Thin layer of light gray vinyl tile

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Vinyl/Binder, Fine grains, Fine particles	None Detected ND	**None Detected ND**

Layer 5 of 5 **Description:** Trace of black asphaltic mastic

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Mastic/Binder, Asphaltic Particles	Cellulose <1%	**Chrysotile 2%**

Lab ID: 24086499 **Client Sample #: WC-028**

Location: 244 Robert Gray Dr Ilwaco, WA

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government

Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: Mr. James Farrow
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2414418.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 29
Samples Analyzed: 29
Method: EPA/600/R-93/116

Layer 1 of 1 **Description:** Black foamy material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Synthetic foam	None Detected ND	**None Detected ND**

Lab ID: 24086500 **Client Sample #: WC-029**

Location: 244 Robert Gray Dr Ilwaco, WA

Layer 1 of 1 **Description:** Black foamy material

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Synthetic foam	None Detected ND	**None Detected ND**

Sampled by: Client
Analyzed by: Urooj Yousuf **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government

ASBESTOS LABORATORY SERVICES

NVL

Company	Terraphase Engineering Inc	**NVL Batch Number**	**2414418.00**
Address	610 SW Broadway, Ste. 407 Portland, OR 97205	**TAT** 5 Days	**AH** No
		Rush TAT	
Project Manager	Mr. James Farrow	**Due Date** 8/19/2024	**Time** 10:00 AM
Phone	(503) 380-3233	**Email**	james.farrow@terraphase.com
Cell	(503) 380-3233	**Fax**	() -

Project Name/Number: W093 **Project Location:** 244 Robert Gray Dr Ilwaco, WA

Subcategory PLM Bulk

Item Code ASB-02 EPA 600/R-93-116 Asbestos by PLM <bulk>

Total Number of Samples 29 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	24086472	WC-001		A
2	24086473	WC-002		A
3	24086474	WC-003		A
4	24086475	WC-004		A
5	24086476	WC-005		A
6	24086477	WC-006		A
7	24086478	WC-007		A
8	24086479	WC-008		A
9	24086480	WC-009		A
10	24086481	WC-010		A
11	24086482	WC-011		A
12	24086483	WC-012		A
13	24086484	WC-013		A
14	24086485	WC-014		A
15	24086486	WC-015		A
16	24086487	WC-016		A
17	24086488	WC-017		A
18	24086489	WC-018		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	UPS				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/12/24	1000
Analyzed by	Urooj Yousuf		NVL	8/16/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 8/12/2024
Time: 1:59 PM
Entered By: Kelly AuVu

ASBESTOS LABORATORY SERVICES

Company	Terraphase Engineering Inc	**NVL Batch Number**	**2414418.00**
Address	610 SW Broadway, Ste. 407 Portland, OR 97205	**TAT** 5 Days **AH** No **Rush TAT**	
Project Manager	Mr. James Farrow	**Due Date** 8/19/2024 **Time** 10:00 AM	
Phone	(503) 380-3233	**Email**	james.farrow@terraphase.com
Cell	(503) 380-3233	**Fax**	() -

Project Name/Number: W093 **Project Location:** 244 Robert Gray Dr Ilwaco, WA

Subcategory PLM Bulk

Item Code ASB-02 EPA 600/R-93-116 Asbestos by PLM <bulk>

Total Number of Samples 29 Rush Samples

	Lab ID	Sample ID	Description	A/R
19	24086490	WC-019		A
20	24086491	WC-020		A
21	24086492	WC-021		A
22	24086493	WC-022		A
23	24086494	WC-023		A
24	24086495	WC-024		A
25	24086496	WC-025		A
26	24086497	WC-026		A
27	24086498	WC-027		A
28	24086499	WC-028		A
29	24086500	WC-029		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	UPS				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/12/24	1000
Analyzed by	Urooj Yousuf		NVL	8/16/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 8/12/2024
Time: 1:59 PM
Entered By: Kelly AuVu

CHAIN of CUSTODY SAMPLE LOG

2414418

Client: Terraphase Engineering Inc
Street: 610 SW Broadway, Ste. 407
Portland, OR 97205
Project Manager: Mr. James Farrow
Project Location: 246 Robert Gray Pr, Ilwaco WA
Phone: (503) 380-3233 Fax: () -

NVL Batch Number:
Client Job Number: W093
Total Samples: Twenty Nine (29)
Turn Around Time: ☐ 1 Hr ☐ 6 Hrs ☐ 3 Days ☐ 10 Days ☐ 2 Hrs ☐ 1 Day ☐ 4 Days ☐ 4 Hrs ☐ 2 Days ☒ 5 Days
Please call for TAT less than 24 Hrs
Email address: james.farrow@terraphase.com
Cell (503) 380-3233

☐ Asbestos Air	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II)	☐ Other	
☒ Asbestos Bulk	☒ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM BULK		
☐ Mold/Fungus	☐ Mold Air	☐ Mold Bulk	☐ Rotometer Calibration			

METALS	Det. Limit	Matrix		RCRA Metals	☐ All 8	Other Metals
☐ Total Metals	☐ FAA (ppm)	☐ Air Filter	☐ Paint Chips in %	☐ Arsenic (As)	☐ Lead (Pb)	☐ All 3
☐ TCLP	☐ ICP (ppm)	☐ Drinking water	☐ Paint Chips in cm2	☐ Barium (Ba)	☐ Mercury (Hg)	☐ Copper (Cu)
☐ Cr 6	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Waste Water	☐ Cadmium (Cd)	☐ Selenium (Se)	☐ Nickel (Ni)
	☐ CVAA (ppb)	☐ Soil	☐ Other	☐ Chromium (Cr)	☐ Silver (Ag)	☐ Zinc (Zn)

☐ Other Types of Analysis: ☐ Fiberglass ☐ Nuisance Dust ☐ Other (Specify) _____ ☐ Silica ☐ Respirable Dust

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample are, Sample Volume, etc)	A/R
1		WC-001	Entrance brick pillar - Brown	
2		WC-002	Entrance brick pillar - Brown	
3		WC-003	Entrance brick pillar - Brown	
4		WC-004	Pebble concrete foundation - Gray	
5		WC-005	Pebble concrete foundation - Gray	
6		WC-006	Pebble concrete foundation - Gray	
7		WC-007	Composite Roof shingle with Black adhesive - Black	
8		WC-008	Composite Roof shingle with black adhesive - Black	
9		WC-009	Composite Roof shingle with Black adhesive - black	
10		WC-010	Gray exterior wooden column	
11		WC-011	Gray exterior wooden column	
12		WC-012	light Blue exterior wall	
13		WC-013	light Blue exterior wall	
14		WC-014	light Blue exterior wall	
15		WC-015	Exterior Pipe insulation for AC	

	Print Below	Sign Below	Company	Date	Time
Sampled by	Aditya Mandhar		TEI	8/1	1300
Relinquished by	Aditya Mandhar		TEI	8/1	1530
Received by	Kennaem		NVL	8/12/24	1000LP
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

Page 2 of 2

CHAIN of CUSTODY
SAMPLE LOG

2414418

Client: Terraphase Engineering Inc
Street: 610 SW Broadway, Ste. 407
Portland, OR 97205

Project Manager: Mr. James Farrow
Project Location: 244 Robertson Dr, Ilwaco WA

Phone: (503) 380-3233 Fax: () -

NVL Batch Number:
Client Job Number: W043
Total Samples: Twenty nine (29)
Turn Around Time: ☐ 1 Hr ☐ 6 Hrs ☐ 3 Days ☐ 10 Days ☐ 2 Hrs ☐ 1 Day ☐ 4 Days ☐ 4 Hrs ☐ 2 Days ☒ 5 Days
Please call for TAT less than 24 Hrs

Email address: james.farrow@terraphase.com
Cell (503) 380-3233

☐ Asbestos Air	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II) ☐ Other
☒ Asbestos Bulk	☒ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM BULK
☐ Mold/Fungus	☐ Mold Air	☐ Mold Bulk	☐ Rotometer Calibration	

METALS	Det. Limit	Matrix		RCRA Metals		Other Metals
☐ Total Metals	☐ FAA (ppm)	☐ Air Filter	☐ Paint Chips in %	☐ Arsenic (As)	☐ All 8	☐ All 3
☐ TCLP	☐ ICP (ppm)	☐ Drinking water	☐ Paint Chips in cm2	☐ Barium (Ba)	☐ Lead (Pb)	☐ Copper (Cu)
☐ Cr 6	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Waste Water	☐ Cadmium (Cd)	☐ Mercury (Hg)	☐ Nickel (Ni)
	☐ CVAA (ppb)	☐ Soil	☐ Other	☐ Chromium (Cr)	☐ Selenium (Se)	☐ Zinc (Zn)
					☐ Silver (Ag)	

☐ Other Types of Analysis ☐ Fiberglass ☐ Silica ☐ Nuisance Dust ☐ Respirable Dust ☐ Other (Specify) _____

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample are, Sample Volume, etc)	A/R
16		WC-016	Exterior Pipe insulation for AC	
17		WC-017	Cream dry wall / ~~white~~ white plaster / Red cotton insulation / Aluminum foil insulation	
18		WC-018	↓	
19		WC-019	↓	
20		WC-020	Popcorn-Spray ceiling white / white plaster / cotton insulation / Aluminium foil insulation	
21		WC-021	↓	
22		WC-022	↓	
23		WC-023	Yellow hide plug	
24		WC-024	Bathroom gray Popcorn ceiling	
25		WC-025	Bathroom gray popcorn ceiling	
26		WC-026	Bathroom sheet vinyl and mastic	
27		WC-027	Bathroom sheet vinyl and mastic	
28		WC-028	~~Acoustic~~ Acoustic insulation	
29		WC-029	Acoustic insulation	
30				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Aditya Manohar		TEI	8/9	1300
Relinquished by	Aditya Manohar		TEI	8/9	1530
Received by	Kenneth		NVL	8/12/24	1000 LPS
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

Page 1 of 2

September 3, 2024

NVL
INDUSTRIAL HYGIENE SERVICES
LABORATORY + MANAGEMENT + TRAINING

James Farrow
Terraphase Engineering Inc
610 SW Broadway, Ste. 407
Portland, OR 97205

RE: Bulk Asbestos Fiber Concentration by Point Count
NVL Batch # 2415712

Client Project: W093
Location: 244 Robert Gray Dr Ilwaco, WA

Dear Mr. Farrow,

At your request, NVL Laboratories conducted analysis of your sample to determine the asbestos concentration using point count procedures.

The sample was analyzed for the presence of asbestos fibers using polarized light microscopy (PLM) with dispersion staining in accordance with U.S. EPA method 600/R -93/116.

Eight slides of thoroughly homogenized material are prepared for any given sample that requires point counting. In order to be counted as a point, the crosshairs of the microscope must center on either a fiber or a particle. The analyst counts at least 50 points per slide preparation. A minimum of 400 non-empty points are counted, then the number of counted asbestos fibers are divided by the total number of points counted to arrive at the percentage of asbestos in the sample.

Please see the conclusion section of the lab reports for point count results.

It has been a pleasure to be of service to you. Please feel free to call if there is anything further we can assist you with.

Sincerely,

Hilary Crumley, Manager Asbestos Laboratory

NVLAP
Testing
Lab Code: 102063-0

Enc.: Sample Results

Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)
4708 Aurora Avenue North | Seattle, WA 98103-6516

PLM Point Count
Bulk Asbestos Fibers Analysis

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205
Attention: Mr. James Farrow
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2415712.00
Client Project #: W093
Date Received: 8/29/2024
Samples Received: 2
Samples Analyzed: 2
Method: EPA/600R-93/116

Lab ID : 24093771 **Client Sample #: WC-24 Layer 1**

Sample Description: White compacted powdery material with paint

Introduction: This sample was initially analyzed for Asbestos content using Polarized Light Microscopy (PLM). Asbestos fibers were observed and quantity was determined using calibrated visual area estimation. Asbestos content was originally found to be 2 % in Layer 1 . Corresponding Lab ID 24086495

Prep Slide #	Asbestos Point	Non Asbestos Point	Total Points Counted
1	1	49	50
2	0	50	50
3	2	48	50
4	1	49	50
5	1	49	50
6	2	48	50
7	0	50	50
8	0	50	50
Total	7	393	400

Conclusion: This Sample Contains 1.8 % ASBESTOS

Sampled by: Client
Analyzed by: Hieu Ta
Reviewed by: Hilary Crumley

Date: 08/30/2024
Date: 09/03/2024 Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using EPA 600/R-93/116 Method with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government.

PLM Point Count
Bulk Asbestos Fibers Analysis

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205
Attention: Mr. James Farrow
Project Location: 244 Robert Gray Dr Ilwaco, WA

Batch #: 2415712.00
Client Project #: W093
Date Received: 8/29/2024
Samples Received: 2
Samples Analyzed: 2
Method: EPA/600R-93/116

Lab ID : 24093772 **Client Sample #: WC-27 Layer 5**

Sample Description: Trace of black asphaltic mastic

Introduction: This sample was initially analyzed for Asbestos content using Polarized Light Microscopy (PLM). Asbestos fibers were observed and quantity was determined using calibrated visual area estimation. Asbestos content was originally found to be 2 % in Layer 5 . Corresponding Lab ID 24086498

Prep Slide #	Asbestos Point	Non Asbestos Point	Total Points Counted
1	0	50	50
2	2	48	50
3	1	49	50
4	0	50	50
5	3	47	50
6	2	48	50
7	0	50	50
8	1	49	50
Total	9	391	400

Conclusion: This Sample Contains 2.3 % ASBESTOS

Sampled by: Client
Analyzed by: Hieu Ta
Reviewed by: Hilary Crumley

Date: 08/30/2024

Date: 09/03/2024 Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using EPA 600/R-93/116 Method with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government.

ASBESTOS LABORATORY SERVICES

Company	Terraphase Engineering Inc	**NVL Batch Number**	**2415712.00**
Address	610 SW Broadway, Ste. 407 Portland, OR 97205	**TAT** 1 Day **AH** No **Rush TAT**	
Project Manager	Mr. James Farrow	**Due Date** 8/30/2024 **Time** 4:35 PM	
Phone	(503) 380-3233	**Email**	james.farrow@terraphase.com
Cell	(503) 380-3233	**Fax**	() -

Project Name/Number: W093 **Project Location:** 244 Robert Gray Dr Ilwaco, WA

Subcategory PLM Bulk

Item Code ASB-03 EPA 600/R-93-116 Asbestos by PLM (400 points) <bulk>

Total Number of Samples 2 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	24093771	WC-24 Layer 1		A
2	24093772	WC-27 Layer 5		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/29/24	1635
Analyzed by	Hieu Ta		NVL	8/30/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions: Samples originally from batch 2414418

Date: 8/30/2024
Time: 8:15 AM
Entered By: Kelly AuVu

2415712

Kelly Au Vu

From: James Farrow <james.farrow@terraphase.com>
Sent: Thursday, August 29, 2024 3:26 PM
To: Client Services
Cc: Aditya Manohar
Subject: RE: Your completed NVL Draft Report document: W093 244 Robert Gray Dr Ilwaco WA
Attachments: Welcome Center - Asbestos Analytical Report.pdf

Good afternoon, can we please request a 400-point count on the following asbestos samples to better qualify the result:

- White popcorn ceiling texture (sample WC-24)
- Black adhesive mastic (sample WC-27)

Best regards

James Farrow, RG, LHg, CEM
Principal Hydrogeologist
Terraphase Engineering Inc.
610 SW Broadway, Suite 405 | Portland, OR 97205 | www.terraphase.com
phone: 503.889.0367| direct: 510.645.1850 ext. 30 | cell: 503.380.3233 |fax: 510.380.6304
james.farrow@terraphase.com
Licensed Geologist in: OR, WA, CA and AZ



From: clientservices@nvllabs.com <clientservices@nvllabs.com>
Sent: Friday, August 23, 2024 7:00 AM
To: James Farrow <james.farrow@terraphase.com>
Subject: Your completed NVL Draft Report document: W093 244 Robert Gray Dr Ilwaco WA

Your requested analysis is complete, please see the attached document:

Client Job Number: W093
NVL Labs Batch ID: 2414891
Company Name: Terraphase Engineering Inc
Project Location: 244 Robert Gray Dr Ilwaco WA
Date: 8/21/2024

Thank you for choosing NVL Labs, we appreciate your business!

Thanks & Regards,

Client Services

Kelly Au Vu

From: James Farrow <james.farrow@terraphase.com>
Sent: Thursday, August 29, 2024 4:33 PM
To: Client Services
Cc: Aditya Manohar; Client Services
Subject: Re: Your completed NVL Draft Report document: W093 244 Robert Gray Dr Ilwaco WA

One day should be fine.

Thx

James

Get Outlook for iOS

From: Client Services <ClientServices@nvllabs.com>
Sent: Thursday, August 29, 2024 3:52:56 PM
To: James Farrow <james.farrow@terraphase.com>
Cc: Aditya Manohar <aditya.manohar@terraphase.com>; Client Services <ClientServices@nvllabs.com>
Subject: RE: Your completed NVL Draft Report document: W093 244 Robert Gray Dr Ilwaco WA

Please see the cost per sample below:

PLM Bulk		1 Hour	2 Hour	4 Hour	6 Hour	1 Day	2
ASB-02	EPA 600/R-93-116 Asbestos by PLM <bulk>	$58.00	$50.75	$43.50		$21.75	$
		* No Additional charges for up to three layers for PLM analysis. Additiona					
ASB-03	EPA 600/R-93-116 Asbestos by PLM (400 points) <bulk>		$119.75	$96.00		$76.25	$

Thanks & Regards,

Client Services

NVL
INDUSTRIAL HYGIENE SERVICES
LABORATORY + MANAGEMENT + TRAINING

www.nvllabs.com
Your feedback is very important to us!

ph: 206.547.0100 | fax: 206.634.1936
toll free: 1.888.NVL.LABS (685.5227)
4708 Aurora Avenue North, Seattle, WA 98103

Please consider the environment before printing this email message.
Disclaimer: This message contains confidential information and is intended only for use by the intended recipients. If you are not the intended recipient you should not disseminate,

August 16, 2024

James Farrow
Terraphase Engineering Inc
610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch # 2414423.00

RE: Total Metal Analysis
Method: EPA 7000B Lead by FAA <paint>
Item Code: FAA-02

Client Project: W093
Location: 244 Robert Gray Dr., Ilwaco WA

Dear Mr. Farrow,

NVL Labs received 7 sample(s) for the said project on 8/12/2024. Preparation of these samples was conducted following protocol outlined in EPA 3051/7000B , unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with EPA 7000B Lead by FAA <paint>. The results are usually expressed in mg/Kg and percentage (%). Test results are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more detail.

At NVL Labs all analyses are performed under strict guidelines of the Quality Assurance Program. If samples were collected by the customer, then the reported test results apply only to the samples as received by NVL Labs. This report is considered highly confidential and will not be released without your approval. Samples are archived after two weeks from the analysis date. Please feel free to contact us at 206-547-0100, in case you have any questions or concerns.

Sincerely,

Shalini Patel, Manager Metals/Org Laboratory

Enc.: Sample results

Analysis Report

Total Lead (Pb)

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr., Ilwaco WA

Batch #: 2414423.00
Matrix: Paint
Method: EPA 3051/7000B
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 7
Samples Analyzed: 7

Lab ID	Client Sample #	Sample Weight (g)	RL in mg/Kg	Results in mg/Kg	Results in percent
24086509	WCP-001	0.1977	51	< 51	<0.0051
24086510	WCP-002	0.1900	53	74	0.0074
24086511	WCP-003	0.1905	52	< 52	<0.0052
24086512	WCP-004	0.2041	49	< 49	<0.0049
24086513	WCP-005	0.2406	42	< 42	<0.0042
24086514	WCP-006	0.2455	41	< 41	<0.0041
24086515	WCP-007	0.2200	45	< 45	<0.0045

Sampled by: Client
Analyzed by: Yasuyuki Hida
Reviewed by: Shalini Patel

Date Analyzed: 08/15/2024
Date Issued: 08/16/2024

Shalini Patel, Manager Metals/Org Laboratory

mg/ Kg =Milligrams per kilogram
Percent = Milligrams per kilogram / 10000
RL = Reporting Limit
'<' = Below the reporting Limit
Note : Method QC results are acceptable unless stated otherwise.
Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

Bench Run No: 2024-0815-06
FAA-02

LEAD LABORATORY SERVICES

Company	Terraphase Engineering Inc	**NVL Batch Number**	**2414423.00**
Address	610 SW Broadway, Ste. 407 Portland, OR 97205	**TAT** 5 Days **AH** No **Rush TAT**	
Project Manager	Mr. James Farrow	**Due Date** 8/19/2024 **Time** 10:00 AM	
Phone	(503) 380-3233	**Email**	james.farrow@terraphase.com
Cell	(503) 380-3233	**Fax**	() -

Project Name/Number: W093 **Project Location:** 244 Robert Gray Dr., Ilwaco WA

Subcategory Flame AA (FAA)

Item Code FAA-02 EPA 7000B Lead by FAA <paint>

Total Number of Samples 7 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	24086509	WCP-001		A
2	24086510	WCP-002		A
3	24086511	WCP-003		A
4	24086512	WCP-004		A
5	24086513	WCP-005		A
6	24086514	WCP-006		A
7	24086515	WCP-007		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	UPS				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/12/24	1000
Analyzed by	Yasuyuki Hida		NVL	8/15/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 8/12/2024
Time: 2:18 PM
Entered By: Kelly AuVu

CHAIN of CUSTODY SAMPLE LOG

2414423

NVL
INDUSTRIAL HYGIENE SERVICES
LABORATORY • MANAGEMENT • TRAINING

Client Terraphase Engineering Inc
Street 610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch Number
Client Job Number W093
Total Samples Seven (7)
Turn Around Time ☐ 1 Hr ☐ 6 Hrs ☐ 3 Days ☐ 10 Days ☐ 2 Hrs ☐ 1 Day ☐ 4 Days ☐ 4 Hrs ☐ 2 Days ☒ 5 Days
Please call for TAT less than 24 Hrs

Project Manager Mr. James Farrow
Project Location 244 Robert Gray Dr, Issaquah WA

Email address james.farrow@terraphase.com

Phone: (503) 380-3233 **Fax:** () -
Cell (503) 380-3233

☐ **Asbestos Air**	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II)	☐ Other	
☐ **Asbestos Bulk**	☐ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM BULK		
☐ **Mold/Fungus**	☐ Mold Air	☐ Mold Bulk	☐ **Rotometer Calibration**			

METALS	**Det. Limit**	**Matrix**		**RCRA Metals**		**Other Metals**
☒ Total Metals	☒ FAA (ppm)	☐ Air Filter	☒ Paint Chips in %	☐ Arsenic (As)	☐ All 8 ☒ Lead (Pb)	☐ **All 3**
☐ TCLP	☐ ICP (ppm)	☐ Drinking water	☐ Paint Chips in cm2	☐ Barium (Ba)	☐ Mercury (Hg)	☐ Copper (Cu)
☐ Cr 6	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Waste Water	☐ Cadmium (Cd)	☐ Selenium (Se)	☐ Nickel (Ni)
	☐ CVAA (ppb)	☐ Soil	☐ Other	☐ Chromium (Cr)	☐ Silver (Ag)	☐ Zinc (Zn)

☐ **Other Types of Analysis**	☐ Fiberglass	☐ Nuisance Dust	☐ Other (Specify)	
	☐ Silica	☐ Respirable Dust		

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample are, Sample Volume, etc)	A/R
1		WCP-001	Drk Gray EXT Trim Slight flaking	
2		WCP-002	Gray EXT Base Good condition	
3		WCP-003	Drk Gray W Ext door fair, Slight flaking	
4		WCP-004	Salmon Int Base Good slight flaking	
5		WCP-005	White Ceiling Paint Good	
6		WCP-006	Brn interior trim Good	
7		WCP-007	Salmon Bathroom Wall Good	
8				
9				
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Sidney Casteel		Advantage Envirn	8/9/24	12:10
Relinquished by	Aditya Munnur		TEI	8/9	1530
Received by	KellyAem		NVL	8/12/24	1000 LPS
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

August 19, 2024

James Farrow
Terraphase Engineering Inc
610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch # 2414420.00

RE: Organics PCB
Method: 8082 PCB Aroclors <Bulk>
Item Code: ORG-05

Client Project: W093
Location: 244 Roberty Gray Dr Ilwaco, WA

Dear Mr. Farrow,

Enclosed please find test results for samples submitted to our laboratory for analysis. Preparation and analysis of these samples were conducted in accordance with published industry standards and methods specified on the attached analytical report.

The content of this package consists of the following:

-Case Narrative & Definition of Data Qualifiers
-Analytical Test Results
-Applicable QC Summary
-Client Chain-of-Custody (CoC)
-NVL Receiving Record

The report is considered highly confidential and will not be released without your approval. Samples are archived for two weeks following analysis. Samples that are not retrieved by the client will be discarded after two weeks.

Thank you for using our laboratory services. If you need further assistance, please contact us at 206-547-0100 or 1-888-NVLLABS.

Sincerely,

Shalini Patel, Manager Metals/Org Laboratory

Enc.: Sample results

NVL Batch # 2414420.00

Case Narrative:

The following summarizes samples received on date as shown on the accompanied Chain of custody by NVL Laboratories, Inc. from Terraphase Engineering Inc for Project Number W093. Samples were logged in for PCB analysis per client request using both customer sample ID's and laboratory assigned ID's as listed on the Chain-of-Custody (CoC). All samples as received were processed and analyzed within specified turnaround time without any abnormalities and deviations that may affect the analytical results. All quality control requirements were acceptable unless stated otherwise. The conditions of all samples were acceptable at time of receipt and all samples submitted with this batch were analyzed unless stated otherwise on the CoC.

Test Results are reported in milligrams per kilogram (mg/kg) for PCB samples as shown on the analytical reports.

NVL Batch # 2414420.00

Definition Appendix

Terms

% Rec	Percent recovery.
<	Below Reporting Limit(RL) or Limit of Quantitation(LoQ) of the instrument.
B	Blank contamination. The recorded results is associated with a contaminated blank.
DF	Dilution Factor
J	The reported concentration is an estimated value because something may be present in the sample that interfered with the analysis.
J1	The reported concentration is an estimated value because the laboratory control sample (LCS) is out of control limits.
J2	The reported concentration is an estimated value because the percent recovery for matrix spike is out of control limits.
J3	The reported concentration is an estimated value because the relative percent difference(RPD) for duplicate analysis is out of control limits.
J4	Percent recovery is outside of established control limits.
LCS	Laboratory Control Sample.
LFS	Laboratory Fortified Spike
Limits	The upper and lower control limits for spike recoveries.
LN	Quality control sample is outside of control limits. This analyte was not detected in the sample.
LOQ	Limit of quantitation(same as RL)
mg/kg	Milligrams per kilogram.
ND	Analyte not detected or below the reporting limit of the instrument or methodology

Definition Appendix

Terms

PPM	Parts per Million.
QC Batch Group	Quality Control Batch Group. The entity that links analytical results and supporting quality control results.
R	The data are not reliable due to possible contamination or loss of material during preparation or analysis. Re-sampling and reanalysis are necessary for verification.
RL	Reporting Limit. The minimum concentration that can be quantified under routine operating conditions.
RPD	Relative Percent Difference. The relative difference between duplicate results(matrix spike, blank spike, or samples duplicate) expressed as a percentage.
RPD Limit	The maximum RPD allowed for a set of duplicate measurements(see RPD).
SSMI	Surrogate has matrix interference.
Spike Conc	The measured concentration, in sample basis units, of a spiked sample.
SURR-ND	Surrogate was not detected due to matrix interference or dilution.
ug/m³	Micrograms per cubic meter.
ug/100cm^2	Micrograms per hundred square centimeter.

Analysis Report

Polychlorinated Biphenyls by Gas Chromatography

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Roberty Gray Dr Ilwaco, WA

Batch #: 2414420.00
Matrix: Bulk
Analysis Method: EPA 8082
Preparation Method: EPA 3546
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 1
Samples Analyzed: 1

Sample Number	**WC-PCB-01**		
Lab Sample ID	24086503	Matrix	Bulk
Initial Sample Size	2.3736 gm	Units of Result	mg/Kg

Analyte	RL	Final Result	Analysis Date
Aroclor-1016	0.84	< 0.84	8/13/2024
Aroclor-1221	0.84	< 0.84	8/13/2024
Aroclor-1232	0.84	< 0.84	8/13/2024
Aroclor-1242	0.84	< 0.84	8/13/2024
Aroclor-1248	0.84	< 0.84	8/13/2024
Aroclor-1254	0.84	< 0.84	8/13/2024
Aroclor-1260	0.84	1.0	8/13/2024
PCBs, Total	**0.84**	**1.0**	

Quality Control Results

Client Project #: W093

Batch #: 2414420.00
Project Manager: Mr. James Farrow

Preparation Method: EPA 3546
Preparation Date: 8/13/2024

Analysis Method: EPA 8082
Analysis Description: Polychlorinated Biphenyls by Gas Chromatography

Blank: 2414420

Analyte	Blank Results	Units	DF	RL	Control Limit	Qualifiers
Aroclor-1016	ND	mg/Kg	1	1.00	1.00	
Aroclor-1221	ND	mg/Kg	1	1.00	1.00	
Aroclor-1232	ND	mg/Kg	1	1.00	1.00	
Aroclor-1242	ND	mg/Kg	1	1.00	1.00	
Aroclor-1248	ND	mg/Kg	1	1.00	1.00	
Aroclor-1254	ND	mg/Kg	1	1.00	1.00	
Aroclor-1260	ND	mg/Kg	1	1.00	1.00	
PCBs, Total	**ND**	**mg/Kg**	**1**			
Surrogates:				% Rec		
Tetrachloro-m-xylene			1	87	40-140	
Decachlorobiphenyl			1	89	40-140	

Lab Control Sample: LCS 1254-2414420

Analyte	Blank Spike Results	Units	DF	Spike Conc	% Rec	Limits	Qualifiers
Aroclor-1254	13	mg/Kg	1	20.00	65	40-140	
Surrogates:							
Tetrachloro-m-xylene			1		78	40-140	
Decachlorobiphenyl			1		75	40-140	

Lab Control Sample: LCS 1016+1260-2414420
Lab Control Sample Duplicate: LCS Dup 1016+1260

Analyte	Blank Spike Results	Units	DF	Spike Conc	% Rec	Limits	RPD %	RPD Limit	Qualifiers
Aroclor-1016	8.5	mg/Kg	1	20.00	43	40-140			
	8.6			20.00	43	40-140	1	50%	
Aroclor-1260	19	mg/Kg	1	20.00	95	40-140			
	19			20.00	95	40-140	0	50%	
Surrogates:									
Tetrachloro-m-xylene			1		100	40-140			
					110	40-140			
Decachlorobiphenyl			1		100	40-140			
					100	40-140			

* Recovery outside of control limits

Bench Run No: 2024-0812-1

ORG-05

Surrogate Recovery Summary Report

Client Terraphase Engineering Inc **Batch #** 2414420.00

Project W093

Customer Sample ID	Lab Sample ID	Analyte	Recovery	Limits
WC-PCB-01	24086503	Decachlorobiphenyl	110%	40-140
WC-PCB-01	24086503	Tetrachloro-m-xylene	100%	40-140

*Recovery outside of the limits

NVL Batch # 2414420.00

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Sample	Analyzed	Analyte	Target	Solution Conc	Unit	% Rec	Limits
ICV-1016	8/12/2024	Aroclor-1016	5.0	4.88	ug/mL	98	85-115
ICV-1254	8/12/2024	Aroclor-1254	5.0	5.47	ug/mL	109	85-115
ICV-1260	8/12/2024	Aroclor-1260	5.0	4.77	ug/mL	95	85-115
CCV1-1016	8/12/2024	Aroclor-1016	5.0	5.00	ug/mL	100	80-120
CCV1-1254	8/12/2024	Aroclor-1254	5.0	5.00	ug/mL	100	80-120
CCV1-1260	8/12/2024	Aroclor-1260	5.0	5.00	ug/mL	100	80-120
CCV2-1016	8/12/2024	Aroclor-1016	5.0	5.20	ug/mL	104	80-120
CCV2-1254	8/12/2024	Aroclor-1254	5.0	5.11	ug/mL	102	80-120
CCV2-1260	8/12/2024	Aroclor-1260	5.0	5.24	ug/mL	105	80-120

% Rec - Percent recovery

* Percent recovery not within control limits

Bench Run No: 2024-0812-1

ORG-05

ORGANICS LABORATORY SERVICES

Company	Terraphase Engineering Inc	**NVL Batch Number**	**2414420.00**
Address	610 SW Broadway, Ste. 407 Portland, OR 97205	**TAT** 5 Days **AH** No **Rush TAT**	
Project Manager	Mr. James Farrow	**Due Date** 8/19/2024 **Time**	10:00 AM
Phone	(503) 380-3233	**Email**	james.farrow@terraphase.com
Cell	(503) 380-3233	**Fax**	() -

Project Name/Number: W093 **Project Location:** 244 Roberty Gray Dr Ilwaco, WA

Subcategory Quantitative analysis

Item Code ORG-05 8082 PCB Aroclors <Bulk>

Total Number of Samples 1 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	24086503	WC-PCB-01		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	UPS				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/12/24	1000
Analyzed by	Evelyn Ahulu		NVL	8/13/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 8/12/2024
Time: 2:14 PM
Entered By: Kelly AuVu

CHAIN of CUSTODY SAMPLE LOG

2414420

Client Terraphase Engineering Inc
Street 610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch Number
Client Job Number W093
Total Samples
Turn Around Time ☐ 1 Hr ☐ 6 Hrs ☐ 3 Days ☐ 10 Days ☐ 2 Hrs ☐ 1 Day ☐ 4 Days ☐ 4 Hrs ☐ 2 Days ☒ 5 Days
Please call for TAT less than 24 Hrs

Project Manager Mr. James Farrow
Project Location 244 Robert Gray Dr, Hwy 101

Email address james.farrow@terraphase.com
Phone: (503) 380-3233 **Fax:** () - **Cell** (503) 380-3233

☐ **Asbestos Air**	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II) ☐ Other
☐ **Asbestos Bulk**	☐ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM BULK
☐ **Mold/Fungus**	☐ Mold Air ☐ Mold Bulk	☐ **Rotometer Calibration**		

METALS	**Det. Limit**	**Matrix**		**RCRA Metals**		**Other Metals**
☐ Total Metals	☐ FAA (ppm)	☐ Air Filter	☐ Paint Chips in %	☐ Arsenic (As)	☐ Lead (Pb)	☐ **All 3**
☐ TCLP	☐ ICP (ppm)	☐ Drinking water	☐ Paint Chips in cm2	☐ Barium (Ba)	☐ Mercury (Hg)	☐ Copper (Cu)
☐ Cr 6	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Waste Water	☐ Cadmium (Cd)	☐ Selenium (Se)	☐ Nickel (Ni)
	☐ CVAA (ppb)	☐ Soil	☐ Other	☐ Chromium (Cr)	☐ Silver (Ag)	☐ Zinc (Zn)

☒ **Other Types of Analysis** ☐ Fiberglass ☐ Nuisance Dust ☐ Other (Specify) PCBs (gas chromatography)
☐ Silica ☐ Respirable Dust

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample are, Sample Volume, etc)	A/R
1		WC-PCB-01	white wall plug and insulation	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Aditya Manohar		TEI	8/9	1300
Relinquished by	Aditya Manohar		TEI	8/9	1530
Received by	Kelly Fell		NVL	8/12/24	1000 LPS
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

August 21, 2024

James Farrow
Terraphase Engineering Inc
610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch # 2414891.00

RE: Total Metal Analysis
Method: EPA 1311/7000B Lead by FAA <TCLP>
Item Code: TCLP-1

Client Project: W093
Location: 244 Robert Gray Dr Ilwaco WA

Dear Mr. Farrow,

NVL Labs received 1 sample(s) for the said project on 8/12/2024. Preparation of these samples was conducted following protocol outlined in EPA 1311/7000B, unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with EPA 1311/7000B Lead by FAA <TCLP>. Sample amount used was below 100 grams as recommended by EPA 1311. The results are usually expressed in mg/L and ppm. Test results are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more detail.

At NVL Labs all analyses are performed under strict guidelines of the Quality Assurance Program. This report is considered highly confidential and will not be released without your approval. Samples are archived after two weeks from the analysis date. Please feel free to contact us at 206-547-0100, in case you have any questions or concerns.

Sincerely,

Shalini Patel, Manager Metals/Org Laboratory

Enc.: Sample results

LAB # 101861

Analysis Report

Toxicity Characteristic Leaching Procedure - Lead (Pb)

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco WA

Batch #: 2414891.00
Matrix: Bulk
Method: EPA 1311/7000B
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 1
Samples Analyzed: 1

Lab ID	Client Sample #	RL mg/ L	Results in mg/L	Results in ppm
24089187	WC-TCLP	0.5	< 0.5	< 0.5

Sampled by: Client
Analyzed by: Yasuyuki Hida
Reviewed by: Shalini Patel

Date Analyzed: 08/21/2024
Date Issued: 08/21/2024

Shalini Patel, Manager Metals/Org Laboratory

mg/ L =Milligrams per liter
ppm = parts per million

RL = Reporting Limit
'<' = Below the reporting Limit

Note : Method QC results are acceptable unless stated otherwise.
Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

Bench Run No: 2024-0820-09

LEAD LABORATORY SERVICES

Company	Terraphase Engineering Inc	**NVL Batch Number**	**2414891.00**
Address	610 SW Broadway, Ste. 407 Portland, OR 97205	**TAT** 4 Days **AH** No **Rush TAT**	
Project Manager	Mr. James Farrow	**Due Date** 8/23/2024 **Time** 11:25 AM	
Phone	(503) 380-3233	**Email**	james.farrow@terraphase.com
Cell	(503) 380-3233	**Fax**	() -

Project Name/Number: W093 **Project Location:** 244 Robert Gray Dr Ilwaco WA

Subcategory Flame AA (FAA)

Item Code TCLP-1 EPA 1311/7000B Lead by FAA <TCLP>

Total Number of Samples 1 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	24089187	WC-TCLP		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/12/24	1000
Analyzed by	Yasuyuki Hida		NVL	8/21/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 8/19/2024
Time: 12:50 PM
Entered By: Kelly AuVu

CHAIN of CUSTODY SAMPLE LOG

2414891

LABORATORY • MANAGEMENT • TRAINING

Client Terraphase Engineering Inc
Street 610 SW Broadway, Ste. 407
Portland, OR 97205

Project Manager Mr. James Farrow
Project Location 344 Robert Gray Dr, Ilwaco WA.

Phone: (503) 380-3233 **Fax:** () -

NVL Batch Number
Client Job Number W093
Total Samples
Turn Around Time ☐ 1 Hr ☐ 6 Hrs ☐ 3 Days ☐ 10 Days ☐ 2 Hrs ☐ 1 Day ☐ 4 Days ☐ 4 Hrs ☐ 2 Days ☒ 5 Days
Please call for TAT less than 24 Hrs

Email address james.farrow@terraphase.com
Cell (503) 380-3233

☐ **Asbestos Air**	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II) ☐ Other
☐ **Asbestos Bulk**	☐ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM BULK
☐ **Mold/Fungus**	☐ Mold Air ☐ Mold Bulk	☐ **Rotometer Calibration**		

METALS	**Det. Limit**	**Matrix**		**RCRA Metals**	☐ All 8	**Other Metals**
☐ Total Metals	☐ FAA (ppm)	☐ Air Filter	☐ Paint Chips in %	☐ Arsenic (As)	☐ Lead (Pb)	☐ **All 3**
☒ TCLP (TCLP only)	☐ ICP (ppm)	☐ Drinking water	☐ Paint Chips in cm2	☐ Barium (Ba)	☐ Mercury (Hg)	☐ Copper (Cu)
☐ Cr 6	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Waste Water	☐ Cadmium (Cd)	☐ Selenium (Se)	☐ Nickel (Ni)
	☐ CVAA (ppb)	☐ Soil	☐ Other	☐ Chromium (Cr)	☐ Silver (Ag)	☐ Zinc (Zn)

☐ **Other Types of Analysis**	☐ Fiberglass	☐ Nuisance Dust	☐ Other (Specify)
	☐ Silica	☐ Respirable Dust	

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample are, Sample Volume, etc)	A/R
1		WC-TCLP	Welcome Center TCLP sample.	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Aditya Manohar		TEI	8/9	1300
Relinquished by	Aditya Manohar		TEI	8/9	1530
Received by	Kelli Aken		NVL	8/12/21	1000
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.
Please Hold Analysis on TCLP

Kelly Au Vu

From: Aditya Manohar <aditya.manohar@terraphase.com>
Sent: Monday, August 19, 2024 11:25 AM
To: Client Services
Cc: James Farrow
Subject: RE: Sampling Bags and COCs for Asbestos, Lead, PCB and TCLP sampling.

Hello NVL,
Also, the TCLP sample will be on a 4-day TAT.

Thanks, please do let me know if there is anything else.

Aditya Manohar, E.I.T
Staff II Engineer
Terraphase Engineering Inc (https://terraphase.com/).

From: Aditya Manohar
Sent: Monday, August 19, 2024 11:13 AM
To: 'Client Services' <ClientServices@nvllabs.com>
Cc: James Farrow <james.farrow@terraphase.com>
Subject: RE: Sampling Bags and COCs for Asbestos, Lead, PCB and TCLP sampling.

Hello NVL,
Thanks for proving the analytical reports for Asbestos, Lead and PCBs.
We would also like you to proceed with analysis of TCLP samples.
Please analyze TCLP for both buildings.

Thank you,

Aditya Manohar, E.I.T
Staff II Engineer
Terraphase Engineering Inc (https://terraphase.com/).

From: Client Services <ClientServices@nvllabs.com>
Sent: Tuesday, August 13, 2024 4:33 PM
To: Aditya Manohar <aditya.manohar@terraphase.com>
Cc: James Farrow <james.farrow@terraphase.com>; Client Services <ClientServices@nvllabs.com>
Subject: RE: Sampling Bags and COCs for Asbestos, Lead, PCB and TCLP sampling.

Good afternoon,

Please see the attached, samples are due 8/19.

TCLPs are on hold as requested, until further instructions are received.

August 19, 2024

INDUSTRIAL HYGIENE SERVICES
LABORATORY + MANAGEMENT + TRAINING

James Farrow
Terraphase Engineering Inc
610 SW Broadway, Ste. 407
Portland, OR 97205

RE: Bulk Asbestos Fiber Analysis; NVL Batch # 2414412.00

Client Project: W093
Location: 244 Robert Gray Dr Ilwaco WA 98624

Dear Mr. Farrow,

Enclosed please find test results for the 8 sample(s) submitted to our laboratory for analysis on 8/12/2024.

Examination of these samples was conducted for the presence of identifiable asbestos fibers using polarized light microscopy (PLM) with dispersion staining in accordance with **U. S. EPA 40 CFR Appendix E to Subpart E of Part 763**, Interim Method for the Determination of Asbestos in Bulk Insulation Samples and **EPA 600/R-93/116**, Method for the Determination of Asbestos in Bulk Building Materials.

For samples containing more than one separable layer of materials, the report will include findings for each layer (labeled Layer 1 and Layer 2, etc. for each individual layer). The asbestos concentration in the sample is determined by calibrated visual estimation.

For those samples with asbestos concentrations between 1 and 10 percent based on visual estimation, the EPA recommends a procedure known as point counting (NESHAPS, 40 CFR Part 61). Point counting is a statistically more accurate means of quantification for samples with low concentrations of asbestos.

The detection limit for the calibrated visual estimation is <1%, 400 point counts is 0.25% and 1000 point counts is 0.1%

Samples are archived for two weeks following analysis. Samples that are not retrieved by the client are discarded after two weeks.

Thank you for using our laboratory services. Please do not hesitate to call if there is anything further we can assist you with.

Sincerely,

Hilary Crumley, Manager Asbestos Laboratory

NVLAP
Testing
Lab Code: 102063-0

Enc.: Sample Results

Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)
4708 Aurora Avenue North | Seattle, WA 98103-6516

Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco WA 98624

Batch #: 2414412.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 8
Samples Analyzed: 8
Method: EPA/600/R-93/116

Lab ID: 24086454 **Client Sample #: EB-01**
Location: 244 Robert Gray Dr Ilwaco WA 98624
Layer 1 of 1 **Description:** Green paint with debris

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Paint/Binder, Debris, Fine particles	Cellulose	4%	**None Detected ND**
	Organic fibers	2%	
	Synthetic fibers	2%	

Lab ID: 24086455 **Client Sample #: EB-02**
Location: 244 Robert Gray Dr Ilwaco WA 98624
Layer 1 of 1 **Description:** Black paint with debris

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Paint/Binder, Debris, Fine particles	Spider silk	9%	**None Detected ND**
	Cellulose	4%	

Lab ID: 24086456 **Client Sample #: EB-03**
Location: 244 Robert Gray Dr Ilwaco WA 98624
Layer 1 of 1 **Description:** Gray brittle material with paint

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Concrete/Binder, Paint, Mineral grains	None Detected	ND	**None Detected ND**

Lab ID: 24086457 **Client Sample #: EB-04**
Location: 244 Robert Gray Dr Ilwaco WA 98624
Layer 1 of 1 **Description:** Gray brittle material with paint

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Concrete/Binder, Paint, Mineral grains	None Detected	ND	**None Detected ND**

Sampled by: Client
Analyzed by: Hieu Ta **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government

Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco WA 98624

Batch #: 2414412.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 8
Samples Analyzed: 8
Method: EPA/600/R-93/116

Lab ID: 24086458 **Client Sample #: EB-05**

Location: 244 Robert Gray Dr Ilwaco WA 98624

Layer 1 of 1 **Description:** Gray brittle material with paint and debris

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Concrete/Binder, Paint, Mineral grains	Cellulose	4%	**None Detected ND**
Debris, Fine particles	Organic fibers	3%	

Lab ID: 24086459 **Client Sample #: EB-06**

Location: 244 Robert Gray Dr Ilwaco WA 98624

Layer 1 of 6 **Description:** Soft white coating with metal wire

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Synthetic/Binder, Metal, Wire	None Detected	ND	**None Detected ND**

Layer 2 of 6 **Description:** Soft black coating with metal wire

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Synthetic/Binder, Metal, Wire	None Detected	ND	**None Detected ND**

Layer 3 of 6 **Description:** White woven fibrous mesh with paper and debris

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Binder/Filler, Debris, Fine particles	Cellulose	41%	**None Detected ND**
	Glass fibers	33%	

Layer 4 of 6 **Description:** Tan compressed fibrous material

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Binder/Filler, Debris, Fine particles	Cellulose	87%	**None Detected ND**

Layer 5 of 6 **Description:** Black asphaltic material

Non-Fibrous Materials:	Other Fibrous Materials:	%	**Asbestos Type: %**
Asphalt/Binder, Asphaltic Particles, Debris	Cellulose	4%	**None Detected ND**

Sampled by: Client
Analyzed by: Hieu Ta **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government

Bulk Asbestos Fibers Analysis

By Polarized Light Microscopy

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco WA 98624

Batch #: 2414412.00
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 8
Samples Analyzed: 8
Method: EPA/600/R-93/116

Layer 6 of 6 **Description:** Silver paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Paint/Binder, Debris, Fine particles	None Detected ND	**None Detected ND**

Lab ID: 24086460 **Client Sample #: EB-07**

Location: 244 Robert Gray Dr Ilwaco WA 98624

Layer 1 of 1 **Description:** Tan compressed fibrous material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Paint, Fine particles	Cellulose 85%	**None Detected ND**

Lab ID: 24086461 **Client Sample #: EB-08**

Location: 244 Robert Gray Dr Ilwaco WA 98624

Layer 1 of 1 **Description:** Tan compressed fibrous material with paint

Non-Fibrous Materials:	Other Fibrous Materials:%	**Asbestos Type: %**
Binder/Filler, Paint, Fine particles	Cellulose 88%	**None Detected ND**

Sampled by: Client
Analyzed by: Hieu Ta **Date:** 08/16/2024
Reviewed by: Hilary Crumley **Date:** 08/19/2024

Hilary Crumley, Manager Asbestos Laboratory

Note: If samples are not homogeneous, then subsamples of the components were analyzed separately. All bulk samples are analyzed using both EPA 600/R-93/116 and EPA 40 CFR Appendix E to Subpart E of Part 763 with the following measurement uncertainties for the reported % Asbestos (1%=0-3%, 5%=1-9%, 10%=5-15%, 20%=10-30%, 50%=40-60%). This report relates only to the items tested. If sample was not collected by NVL personnel, then the accuracy of the results is limited by the methodology and acuity of the sample collector. This report shall not be reproduced except in full, without written approval of NVL Laboratories, Inc. It shall not be used to claim product endorsement by NVLAP or any other agency of the US Government

ASBESTOS LABORATORY SERVICES

Company Terraphase Engineering Inc
Address 610 SW Broadway, Ste. 407
Portland, OR 97205
Project Manager Mr. James Farrow
Phone (503) 380-3233
Cell (503) 380-3233

NVL Batch Number **2414412.00**
TAT 5 Days **AH** No
Rush TAT
Due Date 8/19/2024 **Time** 10:00 AM
Email james.farrow@terraphase.com
Fax () -

Project Name/Number: W093 **Project Location:** 244 Robert Gray Dr Ilwaco WA 98624

Subcategory PLM Bulk
Item Code ASB-02 EPA 600/R-93-116 Asbestos by PLM <bulk>

Total Number of Samples 8 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	24086454	EB-01		A
2	24086455	EB-02		A
3	24086456	EB-03		A
4	24086457	EB-04		A
5	24086458	EB-05		A
6	24086459	EB-06		A
7	24086460	EB-07		A
8	24086461	EB-08		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	UPS				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/12/24	1000
Analyzed by	Hieu Ta		NVL	8/16/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 8/12/2024
Time: 1:25 PM
Entered By: Kelly AuVu

CHAIN of CUSTODY SAMPLE LOG

2414412

Client: Terraphase Engineering Inc
Street: 610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch Number:
Client Job Number: W013
Total Samples: ~~A~~ Eight (8)
Turn Around Time: ☐ 1 Hr ☐ 6 Hrs ☐ 3 Days ☐ 10 Days ☐ 2 Hrs ☐ 1 Day ☐ 4 Days ☐ 4 Hrs ☐ 2 Days ☒ 5 Days
Please call for TAT less than 24 Hrs

Project Manager: Mr. James Farrow
Project Location: 244 Robert Gray Dr Ilwaco WA 98624

Email address: james.farrow@terraphase.com
Phone: (503) 380-3233 Fax: () -
Cell (503) 380-3233

☐ Asbestos Air	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II) ☐ Other
☒ Asbestos Bulk	☒ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM BULK
☐ Mold/Fungus	☐ Mold Air	☐ Mold Bulk	☐ Rotometer Calibration	

METALS	Det. Limit	Matrix		RCRA Metals		Other Metals
☐ Total Metals	☐ FAA (ppm)	☐ Air Filter	☐ Paint Chips in %	☐ Arsenic (As)	☐ All 8	☐ All 3
☐ TCLP	☐ ICP (ppm)	☐ Drinking water	☐ Paint Chips in cm2	☐ Barium (Ba)	☐ Lead (Pb)	☐ Copper (Cu)
☐ Cr 6	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Waste Water	☐ Cadmium (Cd)	☐ Mercury (Hg)	☐ Nickel (Ni)
	☐ CVAA (ppb)	☐ Soil	☐ Other	☐ Chromium (Cr)	☐ Selenium (Se)	☐ Zinc (Zn)
					☐ Silver (Ag)	

☐ Other Types of Analysis: ☐ Fiberglass ☐ Nuisance Dust ☐ Other (Specify) _____ ☐ Silica ☐ Respirable Dust

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample are, Sample Volume, etc)	A/R
1		EB-01	Interior door paint sample - Green	
2		EB-02	Exterior door paint sample - Black	
3		EB-03	Interior concrete wall - White/Gray	
4		EB-04	Interior concrete wall - white/gray	
5		EB-05	Exterior concrete wall - white/yellow/Gray	
6		EB-06	Wiring insulation.	
7		EB-07	Wooden floor panel	
8		EB-08	Wooden floor panel.	
9		[redacted]		
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Aditya Manohar	Adi	TEI	8/9/24	1300
Relinquished by	Aditya Manohar	Adi	TEI	8/9/24	1530
Received by	Kelly Allen	e	NVL	8/12/24	1000PS
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)
4708 Aurora Avenue North | Seattle, WA 98103-6516

August 16, 2024

James Farrow
Terraphase Engineering Inc
610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch # 2414413.00

RE: Total Metal Analysis
Method: EPA 7000B Lead by FAA <paint>
Item Code: FAA-02

Client Project: W093
Location: 244 Robert Gray Dr Ilwaco WA 98624

Dear Mr. Farrow,

NVL Labs received 5 sample(s) for the said project on 8/12/2024. Preparation of these samples was conducted following protocol outlined in EPA 3051/7000B , unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with EPA 7000B Lead by FAA <paint>. The results are usually expressed in mg/Kg and percentage (%). Test results are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more detail.

At NVL Labs all analyses are performed under strict guidelines of the Quality Assurance Program. If samples were collected by the customer, then the reported test results apply only to the samples as received by NVL Labs. This report is considered highly confidential and will not be released without your approval. Samples are archived after two weeks from the analysis date. Please feel free to contact us at 206-547-0100, in case you have any questions or concerns.

Sincerely,

Shalini Patel, Manager Metals/Org Laboratory

Enc.: Sample results

Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)
4708 Aurora Avenue North | Seattle, WA 98103-6516

Analysis Report

Total Lead (Pb)

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco WA 98624

Batch #: 2414413.00
Matrix: Paint
Method: EPA 3051/7000B
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 5
Samples Analyzed: 5

Lab ID	Client Sample #	Sample Weight (g)	RL in mg/Kg	Results in mg/Kg	Results in percent
24086462	EBP-001	0.2086	48	150000	15
24086463	EBP-002	0.1918	52	50000	5.0
24086464	EBP-003	0.1944	51	81000	8.1
24086465	EBP-004	0.1977	51	31000	3.1
24086466	EBP-005	0.1830	55	< 55	<0.0055

Sampled by: Client
Analyzed by: Yasuyuki Hida
Reviewed by: Shalini Patel

Date Analyzed: 08/14/2024
Date Issued: 08/16/2024

Shalini Patel, Manager Metals/Org Laboratory

mg/ Kg =Milligrams per kilogram
Percent = Milligrams per kilogram / 10000
RL = Reporting Limit
'<' = Below the reporting Limit
Note : Method QC results are acceptable unless stated otherwise.
Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

Bench Run No: 2024-0814-06
FAA-02

LEAD LABORATORY SERVICES

Company	Terraphase Engineering Inc	**NVL Batch Number**	**2414413.00**
Address	610 SW Broadway, Ste. 407 Portland, OR 97205	**TAT** 5 Days **AH** No **Rush TAT**	
Project Manager	Mr. James Farrow	**Due Date** 8/19/2024 **Time** 10:00 AM	
Phone	(503) 380-3233	**Email**	james.farrow@terraphase.com
Cell	(503) 380-3233	**Fax**	() -

Project Name/Number: W093 **Project Location:** 244 Robert Gray Dr Ilwaco WA 98624

Subcategory Flame AA (FAA)

Item Code FAA-02 EPA 7000B Lead by FAA <paint>

Total Number of Samples 5 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	24086462	EBP-001		A
2	24086463	EBP-002		A
3	24086464	EBP-003		A
4	24086465	EBP-004		A
5	24086466	EBP-005		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	UPS				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/12/24	1000
Analyzed by	Yasuyuki Hida		NVL	8/14/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 8/12/2024
Time: 1:32 PM
Entered By: Kelly AuVu

CHAIN of CUSTODY SAMPLE LOG

2414413

Client Terraphase Engineering Inc
Street 610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch Number
Client Job Number W093
Total Samples Five (5)
Turn Around Time ☐ 1 Hr ☐ 6 Hrs ☐ 3 Days ☐ 10 Days ☐ 2 Hrs ☐ 1 Day ☐ 4 Days ☐ 4 Hrs ☐ 2 Days ☒ 5 Days
Please call for TAT less than 24 Hrs

Project Manager Mr. James Farrow
Project Location 244 Robert Hwy OR, Il www WA 98624
Email address james.farrow@terraphase.com
Phone: (503) 380-3233 Fax: () - Cell (503) 380-3233

☐ Asbestos Air	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II) ☐ Other
☐ Asbestos Bulk	☐ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM BULK
☐ Mold/Fungus	☐ Mold Air	☐ Mold Bulk	☐ Rotometer Calibration	

METALS	Det. Limit	Matrix		RCRA Metals		Other Metals
☒ Total Metals	☒ FAA (ppm)	☐ Air Filter	☒ Paint Chips in %	☐ Arsenic (As)	☐ All 8	☐ All 3
☐ TCLP	☐ ICP (ppm)	☐ Drinking water	☐ Paint Chips in cm2	☐ Barium (Ba)	☒ Lead (Pb)	☐ Copper (Cu)
☐ Cr 6	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Waste Water	☐ Cadmium (Cd)	☐ Mercury (Hg)	☐ Nickel (Ni)
	☐ CVAA (ppb)	☐ Soil	☐ Other	☐ Chromium (Cr)	☐ Selenium (Se)	☐ Zinc (Zn)
					☐ Silver (Ag)	

☐ Other Types of Analysis ☐ Fiberglass ☐ Nuisance Dust ☐ Other (Specify) ☐ Silica ☐ Respirable Dust

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample are, Sample Volume, etc)	A/R
1		EBP-001	Int. Door Green Poor - flaking	
2		EBP-002	Int. Wall Poor Flacking white	
3		EBP-003	Ext Door Black Poor flacking	
4		EBP-004	Ext Base White Good	
5		EBP-005	Int floor white fair - flakking	
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Sidney Carter		Advantage	8/9	1300
Relinquished by	Aditya Manohar		TEI	8/12/24	1530
Received by	Kethan Sen		NVL	8/12/24	1600VB
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

August 19, 2024

James Farrow
Terraphase Engineering Inc
610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch # 2414417.00

RE: Organics PCB
Method: 8082 PCB Aroclors <Bulk>
Item Code: ORG-05

Client Project: W093
Location: 244 Robert Gray Dr Ilwaco WA 98624

Dear Mr. Farrow,

Enclosed please find test results for samples submitted to our laboratory for analysis. Preparation and analysis of these samples were conducted in accordance with published industry standards and methods specified on the attached analytical report.

The content of this package consists of the following:

-Case Narrative & Definition of Data Qualifiers
-Analytical Test Results
-Applicable QC Summary
-Client Chain-of-Custody (CoC)
-NVL Receiving Record

The report is considered highly confidential and will not be released without your approval. Samples are archived for two weeks following analysis. Samples that are not retrieved by the client will be discarded after two weeks.

Thank you for using our laboratory services. If you need further assistance, please contact us at 206-547-0100 or 1-888-NVLLABS.

Sincerely,

Shalini Patel, Manager Metals/Org Laboratory

Enc.: Sample results

NVL Batch # 2414417.00

Case Narrative:

The following summarizes samples received on date as shown on the accompanied Chain of custody by NVL Laboratories, Inc. from Terraphase Engineering Inc for Project Number W093. Samples were logged in for PCB analysis per client request using both customer sample ID's and laboratory assigned ID's as listed on the Chain-of-Custody (CoC). All samples as received were processed and analyzed within specified turnaround time without any abnormalities and deviations that may affect the analytical results. All quality control requirements were acceptable unless stated otherwise. The conditions of all samples were acceptable at time of receipt and all samples submitted with this batch were analyzed unless stated otherwise on the CoC.

Test Results are reported in milligrams per kilogram (mg/kg) for PCB samples as shown on the analytical reports.

NVL Batch # 2414417.00

Definition Appendix

Terms

% Rec	Percent recovery.
<	Below Reporting Limit(RL) or Limit of Quantitation(LoQ) of the instrument.
B	Blank contamination. The recorded results is associated with a contaminated blank.
DF	Dilution Factor
J	The reported concentration is an estimated value because something may be present in the sample that interfered with the analysis.
J1	The reported concentration is an estimated value because the laboratory control sample (LCS) is out of control limits.
J2	The reported concentration is an estimated value because the percent recovery for matrix spike is out of control limits.
J3	The reported concentration is an estimated value because the relative percent difference(RPD) for duplicate analysis is out of control limits.
J4	Percent recovery is outside of established control limits.
LCS	Laboratory Control Sample.
LFS	Laboratory Fortified Spike
Limits	The upper and lower control limits for spike recoveries.
LN	Quality control sample is outside of control limits. This analyte was not detected in the sample.
LOQ	Limit of quantitation(same as RL)
mg/kg	Milligrams per kilogram.
ND	Analyte not detected or below the reporting limit of the instrument or methodology

Definition Appendix

Terms

PPM	Parts per Million.
QC Batch Group	Quality Control Batch Group. The entity that links analytical results and supporting quality control results.
R	The data are not reliable due to possible contamination or loss of material during preparation or analysis. Re-sampling and reanalysis are necessary for verification.
RL	Reporting Limit. The minimum concentration that can be quantified under routine operating conditions.
RPD	Relative Percent Difference. The relative difference between duplicate results(matrix spike, blank spike, or samples duplicate) expressed as a percentage.
RPD Limit	The maximum RPD allowed for a set of duplicate measurements(see RPD).
SSMI	Surrogate has matrix interference.
Spike Conc	The measured concentration, in sample basis units, of a spiked sample.
SURR-ND	Surrogate was not detected due to matrix interference or dilution.
ug/m³	Micrograms per cubic meter.
ug/100cm^2	Micrograms per hundred square centimeter.

Analysis Report

Polychlorinated Biphenyls by Gas Chromatography

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco WA 98624

Batch #: 2414417.00
Matrix: Bulk
Analysis Method: EPA 8082
Preparation Method: EPA 3546
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 2
Samples Analyzed: 2

Sample Number **EB-PCB-01**
Lab Sample ID 24086470
Initial Sample Size 1.0210 gm
Matrix Bulk
Units of Result mg/Kg

Analyte	RL	Final Result	Analysis Date
Aroclor-1016	0.98	< 0.98	8/13/2024
Aroclor-1221	0.98	< 0.98	8/13/2024
Aroclor-1232	0.98	< 0.98	8/13/2024
Aroclor-1242	0.98	< 0.98	8/13/2024
Aroclor-1248	0.98	< 0.98	8/13/2024
Aroclor-1254	0.98	< 0.98	8/13/2024
Aroclor-1260	0.98	< 0.98	8/13/2024
PCBs, Total	**0.98**	**< 0.98**	

Analysis Report

Polychlorinated Biphenyls by Gas Chromatography

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco WA 98624

Batch #: 2414417.00
Matrix: Bulk
Analysis Method: EPA 8082
Preparation Method: EPA 3546
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 2
Samples Analyzed: 2

Sample Number **EB-PCB-02**
Lab Sample ID 24086471
Initial Sample Size 1.0353 gm
Matrix Bulk
Units of Result mg/Kg

Analyte	RL	Final Result	Analysis Date
Aroclor-1016	0.97	< 0.97	8/13/2024
Aroclor-1221	0.97	< 0.97	8/13/2024
Aroclor-1232	0.97	< 0.97	8/13/2024
Aroclor-1242	0.97	< 0.97	8/13/2024
Aroclor-1248	0.97	< 0.97	8/13/2024
Aroclor-1254	0.97	< 0.97	8/13/2024
Aroclor-1260	0.97	< 0.97	8/13/2024
PCBs, Total	**0.97**	**< 0.97**	

Quality Control Results

Client Project #: W093

Batch #: 2414417.00
Project Manager: Mr. James Farrow

Preparation Method: EPA 3546
Preparation Date: 8/13/2024

Analysis Method: EPA 8082
Analysis Description: Polychlorinated Biphenyls by Gas Chromatography

Blank: 2414417

Analyte	Blank Results	Units	DF	RL	Control Limit	Qualifiers
Aroclor-1016	ND	mg/Kg	1	1.00	1.00	
Aroclor-1221	ND	mg/Kg	1	1.00	1.00	
Aroclor-1232	ND	mg/Kg	1	1.00	1.00	
Aroclor-1242	ND	mg/Kg	1	1.00	1.00	
Aroclor-1248	ND	mg/Kg	1	1.00	1.00	
Aroclor-1254	ND	mg/Kg	1	1.00	1.00	
Aroclor-1260	ND	mg/Kg	1	1.00	1.00	
PCBs, Total	**ND**	**mg/Kg**	**1**			
Surrogates:				% Rec		
Tetrachloro-m-xylene			1	87	40-140	
Decachlorobiphenyl			1	89	40-140	

Lab Control Sample: LCS 1254-2414417

Analyte	Blank Spike Results	Units	DF	Spike Conc	% Rec	Limits	Qualifiers
Aroclor-1254	13	mg/Kg	1	20.00	65	40-140	
Surrogates:							
Tetrachloro-m-xylene			1		78	40-140	
Decachlorobiphenyl			1		75	40-140	

Lab Control Sample: LCS 1016+1260-2414417
Lab Control Sample Duplicate: LCS Dup 1016+1260

Analyte	Blank Spike Results	Units	DF	Spike Conc	% Rec	Limits	RPD %	RPD Limit	Qualifiers
Aroclor-1016	8.5	mg/Kg	1	20.00	43	40-140			
	8.6			20.00	43	40-140	1	50%	
Aroclor-1260	19	mg/Kg	1	20.00	95	40-140			
	19			20.00	95	40-140	0	50%	
Surrogates:									
Tetrachloro-m-xylene			1		100	40-140			
					110	40-140			
Decachlorobiphenyl			1		100	40-140			
					100	40-140			

* Recovery outside of control limits

Bench Run No: 2024-0812-1

ORG-05

Surrogate Recovery Summary Report

Client Terraphase Engineering Inc **Batch #** 2414417.00

Project W093

Customer Sample ID	Lab Sample ID	Analyte	Recovery	Limits
EB-PCB-01	24086470	Decachlorobiphenyl	85%	40-140
EB-PCB-01	24086470	Tetrachloro-m-xylene	75%	40-140
EB-PCB-02	24086471	Decachlorobiphenyl	82%	40-140
EB-PCB-02	24086471	Tetrachloro-m-xylene	69%	40-140

*Recovery outside of the limits

NVL Batch # 2414417.00

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Sample	Analyzed	Analyte	Target	Solution Conc	Unit	% Rec	Limits
ICV-1016	8/12/2024	Aroclor-1016	5.0	4.88	ug/mL	98	85-115
ICV-1254	8/12/2024	Aroclor-1254	5.0	5.47	ug/mL	109	85-115
ICV-1260	8/12/2024	Aroclor-1260	5.0	4.77	ug/mL	95	85-115
CCV1-1016	8/12/2024	Aroclor-1016	5.0	5.00	ug/mL	100	80-120
CCV1-1254	8/12/2024	Aroclor-1254	5.0	5.00	ug/mL	100	80-120
CCV1-1260	8/12/2024	Aroclor-1260	5.0	5.00	ug/mL	100	80-120
CCV2-1016	8/12/2024	Aroclor-1016	5.0	5.20	ug/mL	104	80-120
CCV2-1254	8/12/2024	Aroclor-1254	5.0	5.11	ug/mL	102	80-120
CCV2-1260	8/12/2024	Aroclor-1260	5.0	5.24	ug/mL	105	80-120

% Rec - Percent recovery

* Percent recovery not within control limits

Bench Run No: 2024-0812-1

ORG-05

ORGANICS LABORATORY SERVICES

Company	Terraphase Engineering Inc	**NVL Batch Number**	**2414417.00**
Address	610 SW Broadway, Ste. 407 Portland, OR 97205	**TAT** 5 Days **AH** No **Rush TAT**	
Project Manager	Mr. James Farrow	**Due Date** 8/19/2024 **Time**	10:00 AM
Phone	(503) 380-3233	**Email**	james.farrow@terraphase.com
Cell	(503) 380-3233	**Fax**	() -

Project Name/Number: W093 **Project Location:** 244 Robert Gray Dr Ilwaco WA 98624

Subcategory Quantitative analysis

Item Code ORG-05 8082 PCB Aroclors <Bulk>

Total Number of Samples 2 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	24086470	EB-PCB-01		A
2	24086471	EB-PCB-02		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	UPS				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/12/24	1000
Analyzed by	Evelyn Ahulu		NVL	8/13/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 8/12/2024
Time: 1:46 PM
Entered By: Kelly AuVu

CHAIN of CUSTODY SAMPLE LOG

2414417

Client: Terraphase Engineering Inc
Street: 610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch Number:
Client Job Number: W093
Total Samples: 2 (TWO)
Turn Around Time: ☐ 1 Hr ☐ 6 Hrs ☐ 3 Days ☐ 10 Days ☐ 2 Hrs ☐ 1 Day ☐ 4 Days ☐ 4 Hrs ☐ 2 Days ☒ 5 Days
Please call for TAT less than 24 Hrs

Project Manager: Mr. James Farrow
Project Location: 244 Robert Gray Dr, Issaquah WA 98624
Email address: james.farrow@terraphase.com
Phone: (503) 380-3233 Fax: () -
Cell (503) 380-3233

☐ Asbestos Air	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II) ☐ Other
☐ Asbestos Bulk	☐ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM BULK
☐ Mold/Fungus	☐ Mold Air	☐ Mold Bulk	☐ Rotometer Calibration	

METALS	Det. Limit	Matrix		RCRA Metals		Other Metals
☐ Total Metals	☐ FAA (ppm)	☐ Air Filter	☐ Paint Chips in %	☐ Arsenic (As)	☐ All 8	☐ All 3
☐ TCLP	☐ ICP (ppm)	☐ Drinking water	☐ Paint Chips in cm2	☐ Barium (Ba)	☐ Lead (Pb)	☐ Copper (Cu)
☐ Cr 6	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Waste Water	☐ Cadmium (Cd)	☐ Mercury (Hg)	☐ Nickel (Ni)
	☐ CVAA (ppb)	☐ Soil	☐ Other	☐ Chromium (Cr)	☐ Selenium (Se)	☐ Zinc (Zn)
					☐ Silver (Ag)	

☒ Other Types of Analysis	☐ Fiberglass	☐ Nuisance Dust	☒ Other (Specify) PCBs (gas chromatography)	
	☐ Silica	☐ Respirable Dust		

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample are, Sample Volume, etc)	A/R
1		EB-PCB-01	White wiring insulation	
2		EB-PCB-02	Black wiring insulation	
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Aditya Manohar		TEI	8/9	1300
Relinquished by	Aditya Manohar		TEI	8/9/24	1530
Received by	Kennedy		mv	8/12/24	1000hrs
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

August 21, 2024

James Farrow
Terraphase Engineering Inc
610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch # 2414893.00

RE: Total Metal Analysis
Method: EPA 1311/7000B Lead by FAA <TCLP>
Item Code: TCLP-1

Client Project: W093
Location: 244 Robert Gray Dr Ilwaco WA 98624

Dear Mr. Farrow,

NVL Labs received 1 sample(s) for the said project on 8/12/2024. Preparation of these samples was conducted following protocol outlined in EPA 1311/7000B, unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with EPA 1311/7000B Lead by FAA <TCLP>. Sample amount used was below 100 grams as recommended by EPA 1311. The results are usually expressed in mg/L and ppm. Test results are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more detail.

At NVL Labs all analyses are performed under strict guidelines of the Quality Assurance Program. This report is considered highly confidential and will not be released without your approval. Samples are archived after two weeks from the analysis date. Please feel free to contact us at 206-547-0100, in case you have any questions or concerns.

Sincerely,

Shalini Patel, Manager Metals/Org Laboratory

Enc.: Sample results

LAB # 101861

Analysis Report

Toxicity Characteristic Leaching Procedure - Lead (Pb)

Client: Terraphase Engineering Inc
Address: 610 SW Broadway, Ste. 407
Portland, OR 97205

Attention: **Mr. James Farrow**
Project Location: 244 Robert Gray Dr Ilwaco WA 98624

Batch #: 2414893.00
Matrix: Bulk
Method: EPA 1311/7000B
Client Project #: W093
Date Received: 8/12/2024
Samples Received: 1
Samples Analyzed: 1

Lab ID	Client Sample #	RL mg/ L	Results in mg/L	Results in ppm
24089189	EB-TCLP	0.5	< 0.5	< 0.5

Sampled by: Client
Analyzed by: Yasuyuki Hida
Reviewed by: Shalini Patel

Date Analyzed: 08/21/2024
Date Issued: 08/21/2024

Shalini Patel, Manager Metals/Org Laboratory

mg/ L =Milligrams per liter
ppm = parts per million

RL = Reporting Limit
'<' = Below the reporting Limit

Note : Method QC results are acceptable unless stated otherwise.
Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

Bench Run No: 2024-0820-09

LEAD LABORATORY SERVICES

Company	Terraphase Engineering Inc	**NVL Batch Number**	**2414893.00**
Address	610 SW Broadway, Ste. 407 Portland, OR 97205	**TAT** 4 Days **AH** No **Rush TAT**	
Project Manager	Mr. James Farrow	**Due Date** 8/23/2024 **Time**	11:25 AM
Phone	(503) 380-3233	**Email**	james.farrow@terraphase.com
Cell	(503) 380-3233	**Fax**	() -

Project Name/Number: W093 **Project Location:** 244 Robert Gray Dr Ilwaco WA 98624

Subcategory Flame AA (FAA)

Item Code TCLP-1 EPA 1311/7000B Lead by FAA <TCLP>

Total Number of Samples 1 Rush Samples

	Lab ID	Sample ID	Description	A/R
1	24089189	EB-TCLP		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	Client				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Kelly AuVu		NVL	8/12/24	1000
Analyzed by	Yasuyuki Hida		NVL	8/21/24	
Results Called by					
☐ **Faxed** ☐ **Emailed**					

Special Instructions:

Date: 8/19/2024
Time: 1:01 PM
Entered By: Kelly AuVu

CHAIN of CUSTODY SAMPLE LOG

2414893

LABORATORY + MANAGEMENT

Client: Terraphase Engineering Inc
Street: 610 SW Broadway, Ste. 407
Portland, OR 97205

NVL Batch Number:
Client Job Number: W093
Total Samples: 1 (one)
Turn Around Time: ☐ 1 Hr ☐ 6 Hrs ☐ 3 Days ☐ 10 Days ☐ 2 Hrs ☐ 1 Day ☐ 4 Days ☐ 4 Hrs ☐ 2 Days ☒ 5 Days
Please call for TAT less than 24 Hrs

Project Manager: Mr. James Farrow
Project Location: 244 Robert Gray Dr, Ilwaco WA 98624
Email address: james.farrow@terraphase.com
Phone: (503) 380-3233 Fax: () - Cell (503) 380-3233

☐ Asbestos Air	☐ PCM (NIOSH 7400)	☐ TEM (NIOSH 7402)	☐ TEM (AHERA)	☐ TEM (EPA Level II) ☐ Other
☐ Asbestos Bulk	☐ PLM (EPA/600/R-93/116)	☐ PLM (EPA Point Count)	☐ PLM (EPA Gravimetry)	☐ TEM BULK
☐ Mold/Fungus	☐ Mold Air ☐ Mold Bulk	☐ Rotometer Calibration		

METALS	Det. Limit	Matrix		RCRA Metals		Other Metals
☐ Total Metals	☐ FAA (ppm)	☐ Air Filter	☐ Paint Chips in %	☐ Arsenic (As)	☐ All 8	☐ All 3
☒ TCLP	☐ ICP (ppm)	☐ Drinking water	☐ Paint Chips in cm2	☐ Barium (Ba)	☒ Lead (Pb)	☐ Copper (Cu)
☐ Cr 6	☐ GFAA (ppb)	☐ Dust/wipe (Area)	☐ Waste Water	☐ Cadmium (Cd)	☐ Mercury (Hg)	☐ Nickel (Ni)
	☐ CVAA (ppb)	☐ Soil	☐ Other	☐ Chromium (Cr)	☐ Selenium (Se)	☐ Zinc (Zn)
					☐ Silver (Ag)	

☐ Other Types of Analysis	☐ Fiberglass	☐ Nuisance Dust	☐ Other (Specify)
	☐ Silica	☐ Respirable Dust	

Condition of Package: ☐ Good ☐ Damaged (no spillage) ☐ Severe damage (spillage)

Seq. #	Lab ID	Client Sample Number	Comments (e.g Sample are, Sample Volume, etc)	A/R
1		FB-TCLP	Explosives Building TCLP Sample	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

	Print Below	Sign Below	Company	Date	Time
Sampled by	Aditya Manohar		TEI	8/9/24	1300
Relinquished by	Aditya Manohar		TEI	8/9/24	1530
Received by	Kelly ACH		NVL	8/12/24	1000 hrs
Analyzed by					
Results Called by					
Results Faxed by					

Special Instructions: Unless requested in writing, all samples will be disposed of two (2) weeks after analysis.

Please Hold on TCLP Analysis

2414893

Kelly Au Vu

From: Aditya Manohar <aditya.manohar@terraphase.com>
Sent: Monday, August 19, 2024 11:25 AM
To: Client Services
Cc: James Farrow
Subject: RE: Sampling Bags and COCs for Asbestos, Lead, PCB and TCLP sampling.

Hello NVL,
Also, the TCLP sample will be on a 4-day TAT.

Thanks, please do let me know if there is anything else.

Aditya Manohar, E.I.T
Staff II Engineer
Terraphase Engineering Inc (https://terraphase.com/).
610 SW Broadway, Suite 405 | Portland 97205, OR |
aditya.manohar@terraphase.com| Cell: 412 954 7047 |

From: Aditya Manohar
Sent: Monday, August 19, 2024 11:13 AM
To: 'Client Services' <ClientServices@nvllabs.com>
Cc: James Farrow <james.farrow@terraphase.com>
Subject: RE: Sampling Bags and COCs for Asbestos, Lead, PCB and TCLP sampling.

Hello NVL,
Thanks for proving the analytical reports for Asbestos, Lead and PCBs.
We would also like you to proceed with analysis of TCLP samples.
Please analyze TCLP for both buildings.

Thank you,

Aditya Manohar, E.I.T
Staff II Engineer
Terraphase Engineering Inc (https://terraphase.com/).
610 SW Broadway, Suite 405 | Portland 97205, OR |
aditya.manohar@terraphase.com| Cell: 412 954 7047 |

From: Client Services <ClientServices@nvllabs.com>
Sent: Tuesday, August 13, 2024 4:33 PM
To: Aditya Manohar <aditya.manohar@terraphase.com>
Cc: James Farrow <james.farrow@terraphase.com>; Client Services <ClientServices@nvllabs.com>
Subject: RE: Sampling Bags and COCs for Asbestos, Lead, PCB and TCLP sampling.

Good afternoon,

Please see the attached, samples are due 8/19.

TCLPs are on hold as requested, until further instructions are received.

RhinoOne GEOTECHNICAL

Geotechnical Engineering Report

Welcome Center and Entrance Improvements
Cape Disappointment State Park
244 Robert Gray Drive, Ilwaco, Washington

Prepared for:
OTAK
Attn: Mr. Keith J. Bates, ASLA, LEED ap | Project Manager
11241 Willows Road NE, Suite 200
Redmond, Washington 98052

June 16, 2025
Project No. OTK-2022-016

RhinoOne LLC | 2614 SE 129th Court | Vancouver, WA 98683 | phone 360.258.1738

TABLE OF CONTENTS

1.0 INTRODUCTION 2
2.0 SCOPE OF SERVICES 2
3.0 EXPLORATION AND TESTING PROGRAM 2
3.1 Geotechnical Subsurface explorations 2
3.2 Laboratory Testing 3
4.0 SITE GEOLOGIC AND SUBSURFACE CONDITIONS 5
4.1 Geologic Information 5
4.2 Regional Published Geology Summary 5
4.3 Interpreted Subsurface Conditions 5
4.4 Groundwater Observations 6
5.0 GEOTECHNICAL DESIGN RECOMMENDATIONS 6
5.1 Seismic Design Criteria 7
6.0 GEOTECHNICAL DESIGN RECOMMENDATIONS 9
6.1 General 9
6.2 Subsurface Design Profile Recommendations 9
6.3 Building Foundations Design Approach 10
6.4 Spread Foundations Design Recommendations 10
6.5 Foundation Drain Recommendations 11
6.6 Floor Slab Design Recommendations 11
6.7 Retaining Wall Design Recommendations 12
6.8 Excavation and Temporary Shoring Design Recommendations 13
6.9 Pavement Design Recommendations 13
6.10 Design Recommendations for Diamond Pier Pin Piles 14
7.0 CONSTRUCTION RECOMMENDATIONS 15
7.1 Site Preparation 15
7.2 Wet-Weather/Wet-Soil Conditions 16
7.3 Structural Fills 16
7.4 Drainage Considerations 18
8.0 CONSTRUCTION OBSERVATIONS 18
9.0 LIMITATIONS 19
10.0 RESTRICTIONS 19
11.0 REFERENCES 20

SUPPORTING DATA

Appendix A – Figures
Figure 1, Site Location Map
Figure 2, Site Exploration Plan
Figure 3, Quaternary Faults Map

Appendix B – Interpreted Subsurface Conditions Supporting Information
Interpreted Summary Exploration Log
Results of Laboratory Testing

1.0 INTRODUCTION

This report presents Rhino One LLC's (ROL) geotechnical engineering study for the Welcome Center and Entrance Improvements Project for Cape Disappointment State Park located southwest of the City of Ilwaco, Washington on the Long Beach Peninsula. The park is managed by the Washington State Parks and Recreation Commission. The project vicinity is shown on Figure 1, *Site Location Map* and attached in Appendix A.

Project improvements will establish circulation for vehicles and pedestrians and address traffic safety, free flow of traffic into and out of the park, and provide new parking options for cars, RVs, and trucks with trailers. It also includes a new welcome center building and an improved administrative/shop facility in the same vicinity. Other project components include a new restroom building, a covered carport, a trash compactor pad, and improvements to the existing parking lot. The project also includes elevated boardwalks for an overlook platform near the southern tip of O'Neil Lake.

The purpose of this study is to provide geotechnical data for the proposed buildings, pavements, support of the boardwalk, and miscellaneous improvements. This report provides a summary of our subsurface exploration, laboratory testing, geotechnical engineering analysis, seismic design criteria, geotechnical design criteria, and construction recommendations for the proposed project. This report may require modification as the project develops.

2.0 SCOPE OF SERVICES

The scope of services for Rhino One LLC, as a subcontractor to Otak Inc., was completed in general accordance with our Professional Services Subcontract Number 33427.000 dated May 11, 2022. Generally, the services consisted of developing and conducting a coordinated geotechnical subsurface investigation program to understand physical soil and groundwater conditions, inform the design process for the project area, and to summarize the findings in a geotechnical report. The following is a list of the major subtasks for the project.

- Subsurface exploration and laboratory testing
- Geotechnical engineering analysis
- Preparation of this Geotechnical Engineering Report (GER)

3.0 EXPLORATION AND TESTING PROGRAM

3.1 Geotechnical Subsurface explorations

The subsurface exploration program for this project consisted of drilling nine (9) soil test borings with a CME 850 track-mounted drill rig operated by Crisman Pacific Drilling of Dundee, Oregon on September 26 and 27, 2022. The borings (B-01 to B-09) were drilled at the approximate locations shown on the *Site Exploration Plan* (Appendix A, Figure 2) and were drilled to depths between 11.5 and 51.5 feet below ground surface (BGS). The drilling was performed using mud-rotary drilling techniques. Disturbed Standard Penetration Test (SPT) soil samples were obtained at regular 2.5-foot or 5-foot intervals using a 140-pound automatic hammer with an average energy transfer ratio of 73.8% (GeoDesign, Inc. , 2021) during the drilling in general accordance with the *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils* (ASTM D 1586).

The subsurface materials encountered were logged and field classified in general accordance with the Washington State Department of Transportation's (WSDOT) *Geotechnical Design Manual* (GDM) Chapter 4 *Soil and Rock Classification and Logging* (Washington State Department of Transportation, 2021), and with the *Manual-Visual Classification Method* (ASTM D 2488). The SPT samples were collected at desired depths and packaged in moisture-tight bags. The soil samples were reviewed in the laboratory in order to supplement field classifications. Uncorrected blow counts from the SPT sampling are reported on the boring logs. Corrected blow counts [$(N1)_{60}$] were used for our analysis unless otherwise noted. Interpreted summary borings logs are presented in Appendix B. Table 1 describes the explorations completed to date for the project and as shown on the *Site Exploration Plan*.

Table 1. Geotechnical Exploration Program Summary

Exploration Number	Ground Elevation[1] (feet)	Termination Depth[2] (feet)	Exploration Method	Groundwater Depth[3] (feet)
B-01	21	51.5	MR	5
B-02	21	11.5	MR	7.5
B-03	20	26.5	MR	2.5
B-04	20	11.5	MR	2.5
B-05	22	11.5	MR	5
B-06	21	31.5	MR	2.5
B-07	20	11.5	MR	5
B-08	21	11.5	MR	7.5
B-09	20	21.5	MR	5

Notes:
1: Top of boring elevation based on field measurements to known points and estimated from Google Earth. Top of boring elevation and locations shown on Figure 2 should be considered approximate. Boring locations are not surveyed.
2: Below existing ground surface.
3: Groundwater levels are approximate due to use of mud rotary drilling techniques. Groundwater depth estimated based on soil coloration and moisture content of samples collected in each boring at the time of drilling.
MR: Mud-rotary drilling technique using track-mounted drill-rig.

Please note, the borehole locations shown on Figure 2 should be considered approximate as they are based on field measurements to known points rather than survey data. The top of boring elevations shown above and on the boring logs were estimated using the approximate borehole locations and Google Earth Pro© (version 7.3.4.8642, 2022) information and should also be considered approximate. Elevations estimated from Google Earth Pro© are in feet and referenced to the WGS84 geoid.

3.2 Laboratory Testing

Laboratory tests were conducted to provide data on the physical characteristics and engineering properties of the soil essential for engineering studies and analyses. Laboratory tests were conducted on selected soil samples in accordance with standard ASTM methods. The tests conducted include:

- Natural moisture content of selected samples obtained from the borings in general accordance with guidelines presented in ASTM D2216.
- Grain Size Analysis on selected samples obtained from the borings in general accordance with guidelines presented in ASTM C117/D6913.

- Atterberg Limits on selected samples obtained from the borings in general accordance with guidelines presented in ASTM D 4318.

The results of these tests are attached in Appendix B, presented on the test boring log, and are summarized in Table 2 below.

Table 2. Laboratory Testing Results Summary

Sample Depth (feet)	Gravel by Weight (%)	Sand by Weight (%)	Fines by Weight (%)	Atterberg Limits (%)	Additional Testing[1]
Test Boring B-01					
2.5 – 4	0	95.6	4.4		
10 – 11.5	0	93.7	6.3		
15 – 16.5	0	89.2	10.8		
20 – 21.5	0	90.7	9.3		
30 – 31.5	5.8	87.3	7.0		
35 – 36.5	0	15.6	84.4	Liquid Limit = 61% Plastic Limit = 39% Plasticity Index = 22%	
45 – 46	0	63.1	36.9		
50 – 51.5				Liquid Limit = 50% Plastic Limit = 31% Plasticity Index = 19%	
Test Boring B-03					
5 – 6.5	0	96.9	3.1		
10 – 11.5	0	93.5	6.5		
20 – 21.5	0	91.5	8.5		
25 – 26.5	63.9	27.4	8.8		
Test Boring B-06					
7.5 – 9	50.5	45.2	4.3		
12.5 – 14	0	93.4	6.6		
18 – 18.5	0	94.9	5.1		
25 – 26.5	0	90.6	9.4		
31 – 31.5	19.8	72.4	7.8		
Test Boring B-09					
5 – 6.5	0	95.6	4.4		
10 – 11.5	0	92.1	7.9		
15 – 16.5	0	94.8	5.2		
20 – 21.5	0	85.2	14.8		

Notes:
1: No additional laboratory testing was conducted for this project.

4.0 SITE GEOLOGIC AND SUBSURFACE CONDITIONS

4.1 Geologic Information

Site geology and topographic conditions for the proposed project location were evaluated based on a review of geologic and hazard mapping reports, site reconnaissance, and explorations conducted for this and previous studies.

4.2 Regional Published Geology Summary

The project is located on a coastal peninsula north of the mouth of the Columbia River between the Pacific Ocean to the west and Baker Bay to the east. The most prevalent basement rock along the coast and neighboring Willapa Hills consists of Crescent Formation Basalts (CFB). The Crescent Formation material was added to the edge of existing continental landmass through accretion, a process which involves the addition of material to a tectonic plate via subduction, the process by which one plate is forced under the other when two plates collide. The added material consists of sediment, volcanic arcs, seamounts, oceanic crust, or other igneous features and was added to the western edge of the continent during the Miocene and Eocene epochs. The marine formation units experienced significant faulting and folding during the tectonic process.

Since the accretion of the Crescent Formation units, the area was subject to fluvial erosion and deposition from the Columbia River as well as coastal processes from the Pacific Ocean. Published mapping indicates the project is underlain by the beach deposits consisting of mainly fine to coarse grained beach sand and dune sand with minor estuarine deposits (Map unit Qb) (Ma, Madin, Duplantis, & Williams, 2012). Organic rich silt and sand sediments are present in the vicinity of O'Neil Lake.

4.3 Interpreted Subsurface Conditions

As discussed above, to date we completed nine geotechnical test borings for the current project. The approximate locations of the borings are shown on the *Site Exploration Plan* (Appendix A, Figure 2) and a copy of the summary test boring logs are attached in Appendix B.

The subsurface units were grouped based on their engineering properties, geologic origins, and distribution in the subsurface. The subsurface interpretation considered our test borings from the current exploration program as well as geologic information from published sources. Our interpretation emphasized some data points more than others, considering factors such as relative distance to the project area and quality of the data source. Contacts between the units may be more gradational than shown on the test boring logs. Subsurface conditions may vary between explorations. Standard Penetration Test (SPT) N-values presented on the exploration logs are in blows per foot (bpf) as counted in the field and do not include corrections.

The subsurface materials encountered were logged and field classified in general accordance with the Washington State Department of Transportation's (WSDOT) *Geotechnical Design Manual* (GDM) Chapter 4 *Soil and Rock Classification and Logging* (2021) and with the *Manual-Visual Classification Method* (ASTM D 2488). The SPT samples were collected at desired depths and packaged in moisture-tight bags. The soil samples were reviewed in the laboratory in order to supplement field classifications. Uncorrected blow counts from the SPT sampling are reported on the boring logs. Corrected blow counts [$(N1)_{60}$] were used for our analysis unless otherwise noted. Interpreted summary borings logs are presented in Appendix B. Table 1 above summarizes the explorations completed to date for the project and are shown on the *Site Exploration Plan* (Figure 2, Appendix A).

4.3.1 Beach Deposits

Beach deposit sandy soils were encountered in all borings below the topsoil or roadway surface section. Borings B-02 through B-09 were terminated in this unit at depths ranging from 11.5 feet to 31.5 feet below the existing ground surface (bgs). The beach deposit soils were encountered to a depth of 46 feet bgs in boring B-01. Generally, these soils consisted of loose to very dense, poorly-graded sand with trace to some silt (SP/SP-SM). Layered organics consisting of wood and shells were encountered in the sandy soils. Silty gravel (GP-GM) soils and sandy soils with trace to some gravels were encountered within the beach deposits below depths between of 25 feet and 33 feet bgs in borings B-01, B-03, and B-06. Interbedded layers of finer grained estuarine deposits of very soft to medium stiff, organic silts (OL) or elastic silts (MH) and dense clayey sands (SC) were observed within the sandy soils. These estuarine deposit layers were generally observed south and east of O'Neil Lake in boring B-01 between depths of 33 feet and 46 feet, in boring B-06 between depths of 10 feet and 12.5 feet, and at the termination of boring B-03 between depths of 26.3 feet and 26.5 feet bgs. The measured natural water content from samples of this material ranged from 7.2 to 83 percent with an average and median of 27.1 and 23.6 percent, respectively. The fines content by weight of selected samples of this material ranged from 3.1 to 84.4 percent with an average and median fines content of 12.6 and 7.4 percent, respectively. The N-values observed in this layer ranged from 1 to 55 bpf with an average and median of 20.1 and 14 bpf, respectively.

4.3.2 Crescent Formation

Intensely weathered to decomposed Crescent Formation siltstone was encountered below the beach deposits in boring B-01 at a depth of 46 feet bgs. The weathered siltstone was observed to the termination depth of 51.5 feet bgs. The weathered siltstone consists of medium stiff to very stiff, blue-grey, high plasticity, elastic silt (MH). The measured natural water content from samples of this material ranged from 34 to 35 percent. The N-values observed in this layer ranged from 7 to 21 bpf with an average of 14 bpf.

4.4 Groundwater Observations

Our borings were drilled using mud-rotary drilling techniques. Therefore, groundwater could not be directly measured. We have estimated static groundwater at each boring location between 2.5 and 7.5 feet bgs based on soil coloration and moisture content. It is possible the groundwater level may rise within inches of the ground surface during periods of heavy rainfall.

5.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

Based on a review of the Concept plan dated May 2022 and provided to us by Otak, the project's major geotechnical elements consist of expansion to the existing administration/shop building, a new welcome center building, a new restroom, elevated boardwalks, expanding and repaving the parking lot, a new carport, and a new trash compactor dumpster location.

The proposed administration building expansion is an expansion north of the existing building and is a single-story building. The proposed new restrooms are approximately 70 feet east of the existing restrooms. The proposed welcome center building is located near the intersection of Jetty Road and Fort Canby Road.

The proposed boardwalk has two sections and is expected to be founded on diamond pier pin pile foundations. The first section is located near an existing shed at the northeast corner of the site and runs northwest from the shed to a proposed overlook near O'Neil Lake. The first section of

boardwalk is approximately 120 feet long. The second section of boardwalk runs southwest from the existing shed along the existing gravel path for approximately 200 feet.

5.1 Seismic Design Criteria

The design of the new structures will be governed by 2021 International Building Code (IBC). Therefore, the seismic design will be completed in accordance with American Society of Civil Engineer's (ASCE) *Minimum Design Loads and Associated Criteria for Buildings and Other Structures 2017* (ASCE/SEI 7-16). The following sections provide seismic design criteria in accordance with ASCE/SEI 7-16 (American Society of Civil Engineers, Structural Engineering Institute, 2017).

The code-based design earthquake spectral response acceleration parameters were determined using ASCE's online *Hazard Tool* (American Society of Civil Engineers, 2020). Section 11.4.8 of ASCE/SEI 7-16 recommends a ground motion hazard analysis be completed for structures on Site Class D with S_1 greater than or equal to 0.2 g. This site has S_1 of 0.742 g which is greater than 0.2 g. Therefore, the values for long-period site coefficient (F_v), spectral response acceleration parameter adjusted for site class effects (S_{M1}), and design spectral response acceleration parameter (S_{D1}) at a period of 1 second are not listed in the ASCE's online *Hazard Tool*. Based on our discussions with the structural engineer, the proposed structures are minor structures with fundamental period of vibration less than 0.5 seconds. Therefore, a site response analysis is not required, rather a site class is permitted to be determined in accordance with Section 20.3 of ASCE/SEI 7-16 and corresponding values of F_a and F_v determined from tables 11.4-1 and 11.4-2.

Following the requirements of Section 21.2 of ASCE/SEI 7-16, a probabilistic ground motion analysis was completed using USGS's *Unified Hazard Tool*, version 4.2.0, Dynamic: Conterminous U.S. 2014 (update) for Site Class D (U.S. Department of the Interior, U.S. Geological Survey, 2020). The Risk Targeted Ground Motions (RTGM) was calculated using the USGS RTGM Calculator (U.S. Department of the Interior, U.S. Geological Survey, 2020) in accordance with "Method 2" of Section 21.2.1.2 of ASCE/SEI 7-16. The maximum RTGM spectral acceleration was calculated as 2.047 g at a period of 0.3 second. Since this value is greater than 1.2 times the F_a value, deterministic ground motion analyses are required.

Deterministic ground motion was analyzed for an Interface Earthquake with Magnitude 9 at a distance of 27 km from the site using National Seismic Hazard Mapping web site NSHM Hazard Tool (U.S. Department of the Interior, U.S. Geological Survey, 2020). The combined 2023 Interface earthquake model was used. The maximum S_{a84th} was calculated as 1.86 g at a period of 0.3 seconds. Since this number is greater than 1.5 times the value of F_a, the S_{aM} can be calculated as the minimum of the values for S_{aRT} and S_{a84th}. These parameters are summarized in Table 3 below.

Table 3. ASCE/SEI 7-16 Seismic Design Parameters

	Short Period (0.2 Sec)	Long Period (1 Sec)
Maximum Credible Earthquake Spectral Acceleration (g)	S_s = 1.433 g	S_1 = 0.742 g
Site Class	D	
Results from ASCE/SEI 7-16 Online Calculator		
Site Coefficient	F_a = 1	F_v = N/A
Adjusted Spectral Acceleration (g)	S_{MS} = 1.433	S_{M1} = N/A
Design Spectral Response Acceleration Parameters (g)	S_{DS} = 0.955	S_{D1} = N/A
Mapped PGA (g)	0.73 g	

	Short Period (0.2 Sec)	Long Period (1 Sec)
F_{PGA}	1.1	
PGA_M (g)	0.803 g	
"Method 2" of Section 21.2.1.2 of ASCE/SEI 7-16		
Risk Targeted Ground Motions Spectral Acceleration (Section 21.2, S_{aRT})[1]	2.033 g	1.634 g
Deterministic Ground Motions Spectral Acceleration (Section 21.2, S_{a84th})	1.78 g	1.39 g
Check if Maximum S_{a84th} < 1.5 F_a	No	
Spectral Response Acceleration Parameters	S_{aM} = 1.78 g	S_{D1} = 1.39 g
Design Spectral Acceleration in accordance with Section 11.4.6 with F_v = 2.5	0.955 g	1.237 g
80% Design Spectral Acceleration in accordance with Section 11.4.6 with F_v = 2.5	0.764 g	0.990 g
Recommended Design Spectral Response Acceleration Parameters	**S_{DS} = 1.187 g**	**S_{D1} = 0.927 g**

Notes:
1: Uses scale factors of 1.1 at 0.2 seconds and 1.3 at 1 seconds.

We conducted a preliminary screening for liquefiable soils based on the Bray and Sancio (Bray & Sancio, 2006) criteria, which suggest soils with plasticity indices below 12 with a natural moisture content greater than 0.85 times the liquid limit are susceptible to liquefaction, and using the Boulanger and Idriss (2006) method which provides recommendations the fine-grained soils with a plasticity index less than 7 are susceptible to liquefaction. Soils which met these criteria were considered potentially liquefiable.

ASCE/SEI 7-16 provides peak ground acceleration but does not provide an earthquake magnitude for liquefaction and lateral spreading analysis. A probabilistic ground motion analysis was completed using USGS's *Unified Hazard Tool*, version 4.2.0, Dynamic: Conterminous U.S. 2014 (update) for Site Class D (U.S. Department of the Interior, U.S. Geological Survey, 2020) to determine the earthquake magnitude. Based on this deaggregation analysis, a mean earthquake magnitude of 8.88 at a distance of 27 kilometers from the site was selected.

Liquefaction triggering analyses were completed for a magnitude 8.88 earthquake with a peak ground acceleration of 0.81 g. For this analysis, groundwater was assumed at a depth varying from 2.5 to 5 feet bgs. Liquefaction triggering analysis was completed using the method outlined by Boulanger and Idriss (2014). The computer programs LiqSVs version 2.0.1.6 by GeoLogismiki (2007) were used to analyze the SPT data. A liquefaction hazard was assumed to exist if the calculated factor of safety against liquefaction was less than 1.2. The loose to medium dense material consisting of poorly graded sand from a depth of 2.5 feet (assumed groundwater level) to 20 feet bgs are potentially liquefiable. Our analysis indicates post liquefaction settlement of these soils on the order of 4- to 6-inches could result during a design seismic event.

The nearest mapped crustal fault is located approximately ten miles from the project site as shown on Figure 3, *Quaternary Fault Map* and is attached in Appendix A. This fault is not considered to be active. Therefore, fault rupture at the project site is not a seismic hazard.

Lateral spreading on the site could occur towards the Pacific Ocean. Based on our preliminary analysis, lateral spreading could range from 12- to 18-inches during the design seismic event due to the liquefaction of the soils between 2.5 to 20 feet bgs.

The site is mapped in the tsunami zone. Therefore, tsunami or seiche events represents a significant seismic hazard to the site.

6.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

6.1 General

Based on a review of the Concept plan dated May 2022 and provided to us by Otak, the project's major geotechnical elements consist of expansion to the existing administration/shop building, a new welcome center building, a new restroom, elevated boardwalks, expanding and repaving the parking lot, a new carport, and a new trash compactor dumpster location.

The proposed administration building expansion is an expansion north of the existing building and is a single-story building. The proposed new restrooms are approximately 70 feet east of the existing restrooms. The proposed welcome center building is located near the intersection of Jetty Road and Fort Canby Road. Building loads are not known at this time. For the purposes of this report, we have assumed loads on the order of 150 kips and 6 kips per feet for isolated columns and perimeter foundations, respectively.

The proposed boardwalk has two sections and is expected to be founded on diamond pier pin pile foundations. The first section is located near an existing shed at the northeast corner of the site and runs northwest from the shed to a proposed overlook near O'Neil Lake. The first section of boardwalk is approximately 120 feet long. The second section of boardwalk runs southwest from the existing shed along the existing gravel path for approximately 200 feet.

6.2 Subsurface Design Profile Recommendations

All borings were advanced in the vicinity of the proposed buildings and boardwalk during our exploration program. These borings were drilled to depths of 11.5 to 51.5 feet bgs. Based on the subsurface conditions encountered in these borings, we have developed the following profile for geotechnical analysis of buildings, retaining walls, and boardwalk foundations.

Table 4. Recommended Soil Strength Properties

Subsurface Soil Description (Depth Range)	Effective Unit Weight, γ (pcf)	Angle of Internal Friction, Φ (degree)	Cohesion, c (psf)	L-Pile Soil Model Type	Non-Default, k (pci)	Strain Factor, ε_{50}
Loose to Medium Dense Poorly-graded Sand (0 – 2.5 feet)	110	30	0	Sand	60	NA
Loose to Medium Dense Poorly-graded Sand (2.5 – 12.5 feet)	52.6	30	0	Sand	25	NA
Dense to very dense Poorly-graded Sand (12.5 – 50 feet)	62.6	34	0	Sand	125	NA

Subsurface Soil Description (Depth Range)	Effective Unit Weight, γ (pcf)	Angle of Internal Friction, Φ (degree)	Cohesion, c (psf)	L-Pile Soil Model Type	Non-Default, k (pci)	Strain Factor, ε_{50}

Notes:
pci: pounds per cubic inch
psf: pounds per square foot
Groundwater was encountered at depths of 2.5 to 5 feet bgs at time of drilling. For design assume groundwater at 2.5 feet below ground surface.

6.3 Building Foundations Design Approach

Table 12.13-2 within ASCE/SEI 7-16 defines the upper limit on lateral ground displacement for use of shallow foundations. Based on our calculations, the lateral spreading is on the order of 12- to 18-inches towards the ocean during a design seismic event. Risk category I and II buildings can be supported on shallow spread footing. Risk category IV structures should be supported on deep foundations. The vertical differential settlements are specified in ASCE/SEI 7-16 Table 12.13-3 to be less than 0.0075L for risk category I and II structures. For a 50 feet span, these differential settlements are calculated as 4.5 inches. As noted, before, the post-liquefaction settlements are calculated as 4- to 6-inches with an estimated differential settlement of 2- to 3-inches which is less than the 4.5 inches allowed for a 50 feet span. We recommend that the owner/design team evaluate these lateral spreading and settlements estimates limits for the type of building and decide if shallow spread footing or deep foundations systems are required.

We have provided preliminary recommendations for shallow spread footings. We will provide recommendations for deep foundations if the owner/design team deems that necessary.

6.4 Spread Foundations Design Recommendations

Shallow spread footings can be placed on firm native subgrade or on top of engineered fill. Continuous wall and isolated spread footings should be at least 18 and 24 inches wide, respectively. The bottom of exterior footings should be at least 24 inches below the lowest adjacent exterior grade. The bottom of interior footings should be established at least 18 inches below the base of the floor slab. Due to the settlement risks associated with post-liquefaction settlements, we recommend that the following two measures be used for the design of foundations:

- Use a minimum of 12 inches of compacted gravels below the spread footings, wall footings and grade beams.
- The structural engineer should evaluate if the calculated post-liquefaction differential settlement of 2 to 3 inches is detrimental to the building performance for code required life-safety requirements. Remedial measures such as tying the building together using grade beams or other structural measures should be instituted if needed.

The nominal bearing capacity (un-factored) for footings meeting the above minimum dimensions is 6,000 pounds per square feet (psf). Footings bearing on compact native soils should be sized for an allowable bearing capacity of 2,000 psf (Factor of Safety = 3). This is a net bearing pressure. The weight of the footing and overlying backfill can be disregarded in calculating footing sizes. The recommended allowable bearing pressure applies to the total of dead plus long-term-live loads, and this bearing pressure may be doubled for short-term loads such as those resulting from wind or seismic forces.

Based on our analysis, total post-construction settlements were calculated to be less than 1 inch, with post-construction differential settlement of less than 0.5 inch over a 50-foot span for maximum column and perimeter footing loads of less than 150 kips and 6 kips per linear foot, respectively.

Lateral loads on footings can be resisted by passive earth pressure on the sides of the structures and by friction at the base of the footings. A passive earth pressure of 300 pounds per cubic foot (pcf) may be used for footings confined by native soils. Adjacent floor slabs, pavements, or the upper 24-inch depth of adjacent, unpaved areas should not be considered when calculating passive resistance. For footings in contact with native material, use a coefficient of friction equal to 0.53 when calculating resistance to sliding. Both of these numbers do not include a factor of safety. We recommend a minimum factor of safety of 1.5 be used with these numbers.

The footings should be founded below an imaginary line projecting at a 1-horizontal to 1-vertical (1H:1V) slope from the base of any adjacent parallel utility trenches. The footings must be embedded so there is a minimum of 10 feet of horizontal distance between the base of the footings and any adjacent slope.

A geotechnical engineer or their representative from ROL should confirm suitable bearing conditions and evaluate footing subgrades during construction. Observations should also confirm loose or soft material, organics, unsuitable fill, and topsoil zones were removed. Localized deepening of excavations may be required to penetrate deleterious materials. Any resulting excavations should be backfilled with compacted granular material.

6.5 Foundation Drain Recommendations

We recommend foundation drains around the perimeter foundations of all structures. The foundation drains should be at least 12 inches below the base of the slab. The foundation drain should consist of perforated collector pipes embedded in a minimum 2-foot-wide zone of angular drain rock. Backfill for drains should consist of drain rock meeting the specifications provided in WSDOT SS 9-03.12(4) – Gravel Backfill for Drains. The drain rock should be wrapped in a geotextile fabric meeting the specifications provided in WSDOT – SS 9.33.2(1) Table 3 for soil separation and/or stabilization. The collector pipes should discharge at an appropriate location away from the base of the footings.

6.6 Floor Slab Design Recommendations

For on-grade slabs on native soils, we recommend a 6-inch-thick layer of imported granular material should be placed and compacted over the prepared subgrade. Base aggregate for floor slabs should be clean, crushed rock or crushed gravel. The base aggregate should contain no deleterious materials, meet specifications provided in WSDOT SS 9-03.9(3) – Crushed Surfacing, and have less than 7% by weight passing the U.S. Standard No. 200 Sieve. The imported granular material should be placed in one lift and compacted to at least 95% of the maximum dry density, as determined by ASTM D 1557A subgrade modulus of 100 pounds per cubic inch (pci) may be used to design the floor slab. Please note that during the design seismic event, distress to the building slabs may occur due to differential settlements related to liquefaction. The post liquefaction settlements are calculated to be on the order of 4- to 6- inches.

The design team should evaluate whether a vapor barrier is needed. A vapor barrier will reduce the potential for moisture transmission through and efflorescence growth on the floor slabs. Additionally, flooring manufacturers often require vapor barriers to protect flooring and flooring adhesives and will warrant their product only if a vapor barrier is installed according to their

recommendations. Actual selection and design of an appropriate vapor barrier, if needed, should be based on discussions among members of the design team.

6.7 Retaining Wall Design Recommendations

The retaining wall design recommendations are based on the following assumptions: (1) the walls consist of conventional, cantilevered retaining walls, (2) the walls are less than 10 feet in height, and (3) the backfill is drained. Review of our recommendations will be required if the retaining wall design criteria for the project varies from these assumptions.

Unrestrained site walls which retain native soils should be designed to resist active fluid unit weight of 40 pounds per cubic foot (pcf) where supporting slopes are flatter than 4H:1V. The active fluid unit weight shall be increased to 67 pcf where supporting slopes are 2H:1V. A superimposed seismic lateral force based on a dynamic force of $22H^2$ pounds per lineal foot of wall, where H is the height of the wall in feet and applied at 0.6H from the base of the wall should also be applied to walls supporting slopes flatter that 4H:1V.

Lateral loads on footings can be resisted by passive earth pressure on the sides of the structures and by friction at the base of the footings. Nominal (Un-factored) passive earth pressure of 300 pounds per cubic foot (pcf) may be used for footings confined by native soils. Adjacent floor slabs, pavements, or the upper 24-inch depth of adjacent, unpaved areas should not be considered when calculating passive resistance. For footings in contact with native material, use a coefficient of friction equal to 0.53 when calculating resistance to sliding. These numbers do not contain a factor of safety. We recommend a minimum factor of safety of 1.5.

If other surcharges (foundations, vehicles, etc.) are located within a horizontal distance from the back of a wall equal to twice the height of the wall, then additional pressures will need to be accounted for in the wall design. Contact our office for the appropriate wall surcharges based upon the actual magnitude and configuration of the applied loads. The wall footings should be designed in accordance with the guidelines provided in the “Spread Footing Design Recommendation” section of this report.

The design parameters provided assume that back-of-wall drains will be installed to prevent buildup of hydrostatic pressures behind all walls. A minimum 12-inch-wide zone of drain rock, extending from the base of the wall to within 6 inches of finished grade, should be placed against the back of all retaining walls. Perforated collector pipes should be embedded at the base of the drain rock. The perforated collector pipes should discharge at an appropriate location away from the base of the wall. The backfill material placed behind the walls and extending a horizontal distance equal to at least the height of the retaining wall should consist of granular retaining wall backfill material meeting specifications provided in Section 4 “Retaining Wall Backfill”. We recommend the select granular wall backfill be separated from general fill, native soil and/or topsoil using a geotextile fabric that meets the requirements provided in WSDOT – SS 9.33.2(1) Table 3 for separation and/or soil stabilization. The wall backfill should be compacted to a minimum of 92 percent of the maximum dry density, as determined by ASTM D 1557. Backfill placed within 3 feet of the wall should be compacted in lifts less than 6 inches thick using hand-operated tamping equipment (e.g., jumping jack or vibratory plate compactor.

Settlements of up to one-percent of the wall height commonly occur immediately adjacent to the wall as the wall rotates and develops active lateral earth pressures. Consequently, we recommend construction of flat work adjacent to retaining walls be postponed at least four (4) weeks after backfilling of the wall, unless survey data indicates settlement is complete prior to that time.

6.8 Excavation and Temporary Shoring Design Recommendations

The proposed cuts are anticipated to be minimal on the order of less than 4 feet bgs for construction of foundations and utilities for the project. Trench cuts should stand vertical to a depth of approximately 4 feet, provided no groundwater seepage is present in the trench walls. Open excavation may be used to excavate with the walls of the excavation cut at a slope of 1½H:1V, provided groundwater seepage is not present and with the understanding some sloughing may occur. We encountered groundwater in each of our borings during our exploration. We have estimated static groundwater at each boring location between 2.5 and 7.5 feet bgs based on soil coloration and moisture content. It is possible the groundwater level may rise within inches of the ground surface during periods of heavy rainfall. If groundwater is encountered during construction provisions should be made to keep groundwater at least 2 feet below the bottom of the excavation.

If shoring or dewatering is used, we recommend the type and design of the shoring and dewatering systems be the responsibility of the contractor who is in the best position to choose systems which fit the overall plan of operation. These excavations should be made in accordance with applicable Occupational Safety and Health Administration (OSHA) and state regulations.

6.9 Pavement Design Recommendations

Our pavement recommendations are based on the following assumptions:

- A resilient modulus of 4,500 psi for the native site soils.
- A resilient modulus of 20,000 psi estimated for the base rock.
- Initial and terminal serviceability index of 4.2 and 2.5, respectively.
- Reliability and standard deviation of 85% and 0.45, respectively.
- Structural coefficient of 0.42 and 0.10 for the asphalt and base rock, respectively.
- We assumed several Equivalent Single Axle Loads (ESALs) for pavement design. The actual ESALs should be selected based on traffic levels anticipated as the project moves forward.

If any of these assumptions are incorrect, contact our office with the appropriate information so we may revise the pavement design recommendations. Pavement design recommendations were based on the 1993 AASHTO pavement design equations. The development of pavement designs for the project pavements are in general accordance with the design guidelines and procedures of the American Association of State Highway and Transportation Officials (AASHTO). Summary of our pavement design recommendations are in the table below.

Table 5. Minimum Pavement Sections

Traffic Loading (ESALs)	Asphalt Cement Concrete Thickness (inch)	Aggregate Base Rock Thickness (inch)
10,000	3	8
50,000	4	10
100,000	4.5	12
250,000	5.5	12
500,000	6	15
1,000,000	7	15

The thicknesses shown in the table above are intended to be minimum acceptable values.

The pavement subgrade should be prepared in accordance with the “Site Preparation” and “Structural Fill” sections of this report.

Construction traffic should be limited to non-building, unpaved portions of the project site or haul roads. Construction traffic should be prohibited on new pavements. If construction traffic is allowable on newly constructed road sections, an allowance for this additional traffic is necessary in the design pavement section.

If moist soil conditions make it difficult to properly moisture condition and compact the roadway subgrade, the use of cement amendment should be considered as alternative to moisture conditioning and compaction. The use of cement amendment will allow for construction of the pavement sections without disturbing the sensitive soil subgrade. If this method is chosen, contact our office for additional recommendations and alternative pavement sections.

Applicable specifications as required by WSDOT SS should be followed for the aggregate base rock and asphalt cement concrete lifts. Use hot-mix asphalt (HMA) Class ½”, PG64H-28 for wearing and levelling course. A separation geotextile is recommended below the base rock especially in the native areas which will not receive any additional fill.

We recommend the use of a ½” nominal maximum aggregate size (NMAS) mixture for HMA wearing course and leveling course lifts. Widely recognized construction best practices recommend minimum lift thickness for HMA pavements of 3-4 times the NMAS. The WSDOT Pavement Policy recommends a 1.8-inch minimum lift thickness for ½” NMAS mix.

We recommend that an emulsified asphalt tack coat be applied to all paved surfaces on which any course of HMA is to be placed or abutted. Tack coat shall be uniformly applied to cover the existing pavement with a thin film of asphalt, free of streaks and bare spots. We recommend the tack coat be CSS-1 or CSS-1h and it should be applied at a uniform spray rate of 0.3 to 0.8 gallons per square yard residual. The CSS-1 and CSS-1h emulsified asphalt may be diluted with water; however, dilution should not change the amount of residual asphalt applied to the pavement surface.

Widely recognized construction best practices recommend that successive lifts of HMA be staggered at the longitudinal joint between lanes. The purpose of this practice is to prevent building a pathway for surface water to access the base and subgrade materials. The minimum recommended offset between successive longitudinal joints is usually 6 or 12 inches from the underlying longitudinal joint. We recommend the use of a joint adhesive, such as manufactured by Crafco, to seal the longitudinal joints between leaving lanes in each lift and prevent water from entering the joints.

If it is not feasible to compact the subgrade or if soft conditions or unsuitable soil are encountered due to wet weather, subgrade stabilization should be accomplished in lieu of subgrade compaction. The subgrade stabilization should consist of a minimum of 12 inches of 1-inch-minus dense graded aggregate base over a subgrade geotextile.

6.10 Design Recommendations for Diamond Pier Pin Piles

The proposed boardwalk has two sections and is expected to be founded on diamond pier pin pile foundations. The first section is located near an existing shed at the northeast corner of the site and

runs northwest from the shed to a proposed overlook near O'Neil Lake. The first section of boardwalk is approximately 120 feet long. The second section of boardwalk runs southwest from the existing shed along the existing gravel path for approximately 200 feet.

It is our understanding that the proposed boardwalk structure will be supported on Diamond Pier foundation systems. The vendor, Pin Foundations, Inc., provides factored bearing, uplift, and lateral load capacities for each of the Diamond Pier foundation models on their website (Pin Foundations, Inc., 2022). Note that these foundations systems will not support the boardwalk during the design seismic event and could result in foundation and boardwalk failure. Failure of the boardwalk during design seismic event should be expected. The provided capacities are based on the soil conditions at the site, either silts/clays or sands/gravels. Pin Foundations, Inc. also includes an equivalent footing area for each of the foundation models. Test boring B-09 is located in the boardwalk area. The soil conditions in this boring consists of medium dense to dense sand to the depth drilled (21.5 feet bgs). Groundwater was encountered at a depth of 5 feet during drilling. These soils are modelled as sand/gravel with the vendor. We performed bearing capacity calculations for a traditional footing using the equivalent footing areas. Based on the soil conditions encountered in our explorations and our bearing capacity calculations, we recommend using the capacities provided by Pin Foundations, Inc. for silts/clays. The recommended capacities are in Table 6 below.

Table 6. Diamond Pier Foundation Capacities in Silts and Clays Provided by Pin Foundations, Inc.

Model No. / Pin Length (inches)	Equivalent Footing Area (ft^2)	Bearing Capacity Load (lbs)	Uplift Load Capacity (lbs)	Lateral Load Capacity (lbs)
DP-50 / 36	1.8	3,600	600	600
DP-50 / 42	2.0	4,000	900	600
DP-50 / 50	2.2	4,400	1,200	600
DP-75 / 50	2.5	5,000	1,400	600
DP-75 / 63	2.8	5,600	1,600	600

Notes:
Capacities shown have an applied factor of safety of 2
lbs: pounds

7.0 CONSTRUCTION RECOMMENDATIONS

The construction should be carried out as indicated in accordance with the Washington Department of Transportation *Standard Specifications for Road, Bridge and Municipal Construction*, 2023 version (WSDOT-SS) (Washington State Department of Transportation, 2023). We assume these specifications will serve, in part, as the project specifications for items contained within and for those not included in this report.

7.1 Site Preparation

The existing subgrade consist generally of sand. We understand that the existing building and pavements may be demolished and hauled off from the site. The existing near-surface root zone should be stripped and removed from the project site in all proposed new structures or pavement areas. The actual stripping depth should be based on field observations at the time of construction. Stripped material should be transported off site for disposal or stockpiled for use in landscaped areas or as directed by the Owner.

Trees and shrubs should be removed from all new improvement areas. In addition, root balls should be grubbed out to the depth of the roots, which could exceed 3 feet bgs. Depending on the methods

used to remove the root balls, considerable disturbance and loosening of the subgrade could occur during site grubbing. We recommend soil disturbed during grubbing operations be removed to expose firm undisturbed subgrade. The resulting excavations should be backfilled with structural fill.

Demolition should include removal of existing improvements throughout the project site. Underground utility lines, vaults, basement walls, or tanks should also be removed or grouted full if left in place. The voids resulting from removal of footings, buried tanks, etcetera, or loose soil in utility lines should be backfilled with compacted structural fill. The base of these excavations should be excavated to firm subgrade before filling with sides sloped at a minimum of 1H: 1V to allow for uniform compaction.

Materials generated during demolition of existing improvements should be transported off site or stockpiled in areas designated by the owner. Asphalt, concrete, gravel fill, and base rock materials may be crushed and recycled for use as general fill.

Following stripping and prior to placing foundations, the exposed subgrade should be evaluated by proof-rolling. The subgrade should be proof-rolled with a fully loaded dump truck or similar heavy rubber-tire construction equipment to identify soft, loose, or unsuitable areas. A member of our geotechnical staff should observe the proof-rolling. Soft or loose zones identified during the field evaluation should be compacted to an unyielding condition or be excavated and replaced with structural fill.

7.2 Wet-Weather/Wet-Soil Conditions

Trafficability on the near-surface soils may be difficult during or after extended wet periods or when the moisture content of the surface soil is more than a few percentage points above optimum. Soils which have been disturbed during site-preparation activities, or soft or loose zones identified during probing or proof-rolling, should be removed, and replaced with compacted structural fill.

Track-mounted excavating equipment may be required during wet weather. The thickness of the granular material for haul roads and staging areas will depend on the amount and type of construction traffic. A 12- to 18-inch-thick mat of imported granular material is sufficient for light staging areas. The granular mat for haul roads and areas with repeated heavy-construction traffic typically needs to be increased to between 18- to 24-inches. The actual thickness of haul roads and staging areas should be based on the contractor's approach to site development and the amount and type of construction traffic. The imported granular material should be placed in one lift over the prepared, undisturbed subgrade and compacted using a smooth-drum, non-vibratory roller. Additionally, a geotextile fabric should be placed as a barrier between the subgrade and imported granular material in areas of repeated construction traffic. The imported granular material should be 4- to 6-inch minus pit run rock with less than 10% passing a Standard #200 sieve. Note that it is the contractor's responsibility to protect the subgrade during construction.

7.3 Structural Fills

Fills should be placed over subgrade which has been prepared in conformance with the previous section of this report. Material used as structural fill should be free of organic matter or other unsuitable materials and should meet specifications provided in WSDOT-SS, depending upon the application. Discussion of these materials is in the following sections.

7.3.1 Native Soils

The native soils are suitable for use as general fill, provided it is properly moisture conditioned and meets the requirements of WSDOT – SS 9-03.14(3) – Common Borrow. When used as structural

fill, native soils should be placed in lifts with a maximum un-compacted thickness of 6 to 8 inches and compacted to not less than 92 percent of the maximum dry density as determined by ASTM D 1557.

7.3.2 Imported Granular Fill

Imported granular material should be pit or quarry run rock, crushed rock, or crushed gravel and sand and should meet the specifications provided in WSDOT 9-03.14(1) – Gravel Borrow, WSDOT – SS 9-03.14(2) – Select Borrow or WSDOT SS 9-03.14(4) – Gravel Borrow for Structural Earth Wall. The imported granular material should be fairly well graded between coarse and fine material and have less than 7% by weight passing the U.S. Standard No. 200 Sieve.

Imported granular material should be placed in lifts with a maximum non-compacted thickness of 8 to 12 inches and be compacted to at least 95% of the maximum dry density, as determined by ASTM D 1557. During the wet season or when wet subgrade conditions exist, the initial lift should be approximately 18 inches in non-compacted thickness and should be compacted with a smooth-drum roller without using vibratory action.

Where imported granular material is placed over wet or soft soil subgrades, we recommend a geotextile be placed as a barrier between the subgrade and imported granular material. The geotextile should meet WSDOT – SS 9.33.2(1) Table 3 for soil separation and/or stabilization.

7.3.3 Trench Backfill

Trench backfill placed beneath, adjacent to, and for at least 2 feet above utility lines (i.e., the pipe zone) should consist of well-graded, granular material with a maximum particle size of 1.5 inches, have less than 10% by weight passing the U.S. Standard No. 200 Sieve, and meet WSDOT – SS 9-03.12(3) – Gravel Backfill for Pipe Zone Bedding. The pipe zone backfill should be compacted to at least 90% of the maximum dry density, as determined by ASTM D 1557 or as required by the pipe manufacturer or local building department.

Within roadway alignments or beneath building pads, the remainder of the trench backfill should consist of well-graded, granular material with a maximum particle size of 2.5 inches, have less than 10% by weight passing the U.S. Standard No. 200 Sieve, and meet WSDOT – SS 9-03.10 – Gravel Backfill, or WSDOT – SS 9-03.19 – Bank Run Gravel for Trench Backfill. This material should be compacted to at least 92% of the maximum dry density as determined by ASTM D 1557, or as required by the pipe manufacturer or local building department. The upper 2-feet of the trench backfill should be compacted to at least 95% of the maximum dry density as determined by ASTM D 1557.

Outside of structural improvement areas (e.g., roadway alignments or building pads), trench backfill placed above the pipe zone may consist of general fill materials that are free of organics and materials over 6 inches in size, and meet WSDOT – SS 9-03.15 – Native Material for Trench Backfill. This general trench backfill should be compacted to at least 90% of the maximum dry density, as determined by ASTM D 1557 or as required by the pipe manufacturer or local building department.

7.3.4 Retaining Wall Backfill

Backfill material placed behind retaining walls and extending a horizontal distance of 0.5H, where H is the height of the retaining wall, should consist of select granular material meeting WSDOT – SS 9-03.12(2) – Gravel Backfill for Walls. We recommend the select granular wall backfill be separated

from general fill, native soil and/or topsoil using a geotextile fabric that meets the requirements provided in WSDOT – SS 9.33.2(1) Table 3 for soil separation and/or stabilization.

7.3.5 Trench Drain and Drain Material

Backfill for subsurface trench drains and for a minimum 1-foot-wide zone against the back of retaining walls should consist of drain rock meeting the specifications provided in WSDOT SS 9-03.12(4) – Gravel Backfill for Drains. A pre-fabricated drain board can be substituted for the drain rock. The drain rock should be wrapped in a geotextile fabric meeting the specifications provided in WSDOT – SS 9.33.2(1) Table 3 for soil separation and/or stabilization.

7.3.6 Floor Slab Base Rock

Base aggregate for floor slabs should be clean, crushed rock or crushed gravel. The base aggregate should contain no deleterious materials, meet specifications provided in WSDOT SS 9-03.9(3) – Crushed Surfacing, and have less than 5% by weight passing the U.S. Standard No. 200 Sieve. The imported granular material should be placed in one lift and compacted to at least 95% of the maximum dry density, as determined by ASTM D 1557 dry density, as determined by ASTM D 1557.

7.3.7 Pavement Base Aggregate

Imported base aggregate for roads and parking lots should be clean, crushed rock or crushed gravel. The base aggregate should meet the gradation defined in WSDOT SS 9-03.9(3) – Crushed Surfacing, with the exception that the aggregate should have less than 5% passing a U.S. Standard No. 200 Sieve. The base aggregate should be compacted to at least 95% of the maximum dry density, as determined by ASTM D 1557.

7.4 Drainage Considerations

The Contractor shall be made responsible for temporary drainage of surface water and groundwater as necessary to prevent standing water and/or erosion at the working surface. We recommend removing only the foliage necessary for construction to help minimize erosion.

The ground surface around the structures should be sloped to create a minimum gradient of 2% away from the building foundations for a distance of at least 5 feet. Surface water should be directed away from all buildings into drainage swales or into a storm drainage system. “Trapped” planting areas should not be created next to any building without providing means for drainage. The roof downspouts should discharge onto splash blocks or pavement surfaces which direct water away from the buildings, or into smooth-walled underground drain lines that carry the water to appropriate discharge locations at least 10 feet away from any buildings.

8.0 CONSTRUCTION OBSERVATIONS

Satisfactory earthwork performance depends on the quality of construction. Sufficient observation of the contractor's activities is a key part of determining if the work is completed in accordance with the construction drawings and specifications. We recommend a geotechnical engineer from ROL be retained to observe the retaining wall construction.

Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations discussed above. Recognition of changed conditions requires experience. Therefore, qualified personnel should visit the site with sufficient frequency in order to detect whether subsurface conditions have changed significantly from those anticipated.

9.0 LIMITATIONS

This report has been prepared for the exclusive use of the addressee and engineers and for aiding in the design of the proposed project as discussed above. The opinions, comments, and conclusions presented in this report were based upon information derived from our literature review, subsurface investigation, and laboratory testing. Conditions between or beyond our explorations may vary from those encountered. Unanticipated soil conditions and seasonal soil moisture variations are commonly encountered and cannot be fully determined by merely taking soil samples or soil explorations. Such variations may result in changes to our recommendations and may require additional expenditures be made to attain a properly constructed project.

If there is a substantial lapse of time between the submission of this report and the start of work at the site, if conditions have changed due to natural causes or construction operations at or adjacent to the site, or if the basic project scheme is significantly modified from that assumed, it is recommended this report be reviewed to determine the applicability of the conclusions and recommendations.

10.0 RESTRICTIONS

This report is for the exclusive use of the client for design of the development, as described in our proposal for this particular project, and this report is not to be relied upon by other parties. It is not to be photographed, photocopied, or similarly reproduced, in total or in part, without the expressed written consent of the client and ROL.

Sincerely,
RhinoOne Geotechnical

Levi Good, PE
Staff Geotechnical Engineer



06/16/2025

Rajiv Ali, PE, GE
Principal Geotechnical Engineer

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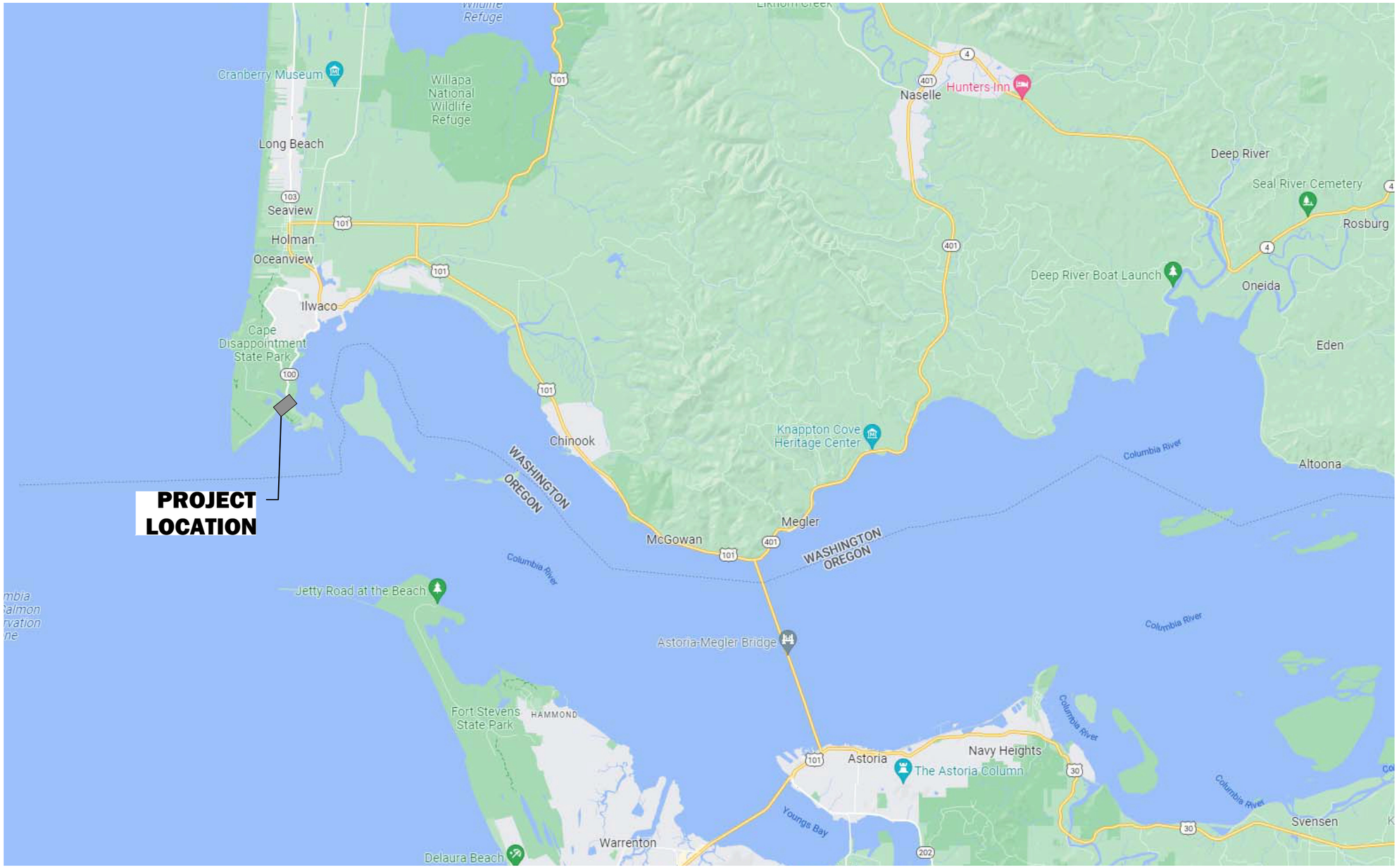
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APPENDIX A

Site Location Map
Site Exploration Plan
Quaternary Faults Map



RhinoOne GEOTECHNICAL
2614 SE 129th Court,
Vancouver, WA 98683
360-258-1738

WELCOME CENTER AND ENTRANCE IMPROVEMENT PROJECT

CAPE DISAPPOINTMENT STATE PARK
ILWACO, WASHINGTON

FIGURE 1 - SITE VICINITY MAP

PROJECT
OTK-2022-016

DATE
JUNE 2025

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LEGEND

B-0#

TEST BORING NUMBER AND APPROXIMATE LOCATION

0 50 100 Feet

RhinoOne GEOTECHNICAL

2614 SE 129th Court,
Vancouver, WA 98683
360-258-1738

WELCOME CENTER AND ENTRANCE IMPROVEMENT PROJECT

CAPE DISAPPOINTMENT STATE PARK
ILWACO, WASHINGTON

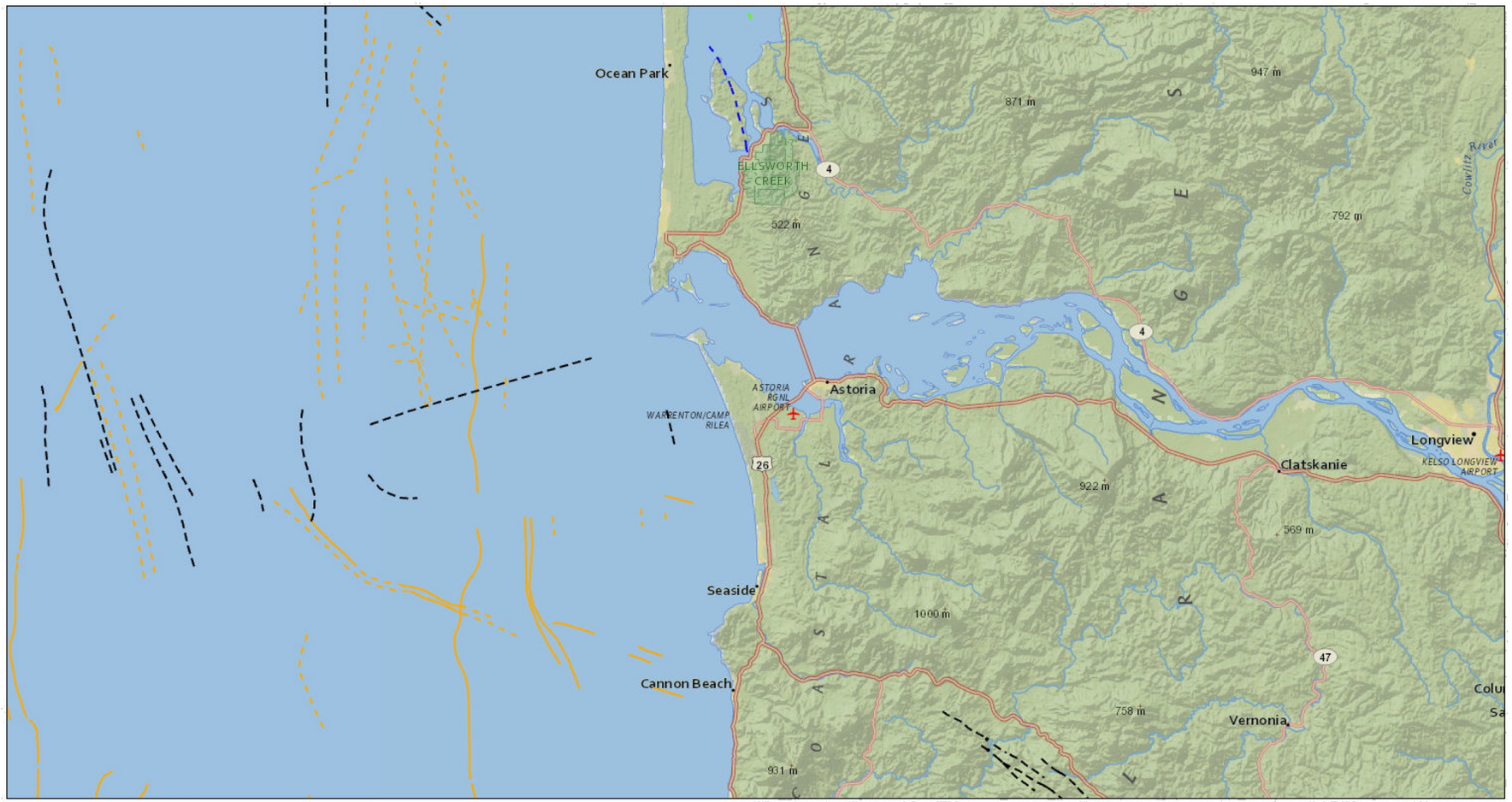
PROJECT
OTK-2022-016

FIGURE 2 - SITE EXPLORATION PLAN

DATE
JUNE 2025

C:\PROJECTS\OTAK\x-OTK-2016-016 CAPE DISAPPOINTMENT\OTK-2022-016 FIG 2.dwg Devin Blackshere Jun 16, 2025 - 12:41pm

U.S. Geological Survey Quaternary Faults



11/4/2022, 1:18:19 PM

Fault Areas
- Class B
- historic
- late Quaternary
- latest Quaternary
- middle and late Quaternary

National Database
- Historic (< 150 years), well constrained location
- Historic (< 150 years), moderately constrained location
- Historic (< 150 years), inferred location
- Latest Quaternary (<15,000 years), well constrained location
- Latest Quaternary (<15,000 years), moderately constrained location
- Latest Quaternary (<15,000 years), inferred location
- Late Quaternary (< 130,000 years), well constrained location
- Late Quaternary (< 130,000 years), moderately contrained location
- Late Quaternary (< 130,000 years), inferred location
- Middle and late Quaternary (< 750,000 years), well constrained location
- Middle and late Quaternary (< 750,000 years), moderately constrained location
- Middle and late Quaternary (< 750,000 years), inferred location
- Undifferentiated Quaternary (< 1.6 million years), well constrained location
- Undifferentiated Quaternary (< 1.6 million years), moderately constrained location
- Undifferentiated Quaternary (< 1.6 million years), inferred location

1:577,791

0 5 10 20 mi

0 5 10 20 km

National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

RhinoOne GEOTECHNICAL

2614 SE 129th Court,
Vancouver, WA 98683
360-258-1738

WELCOME CENTER AND ENTRANCE IMPROVEMENT PROJECT

CAPE DISAPPOINTMENT STATE PARK
ILWACO, WASHINGTON

FIGURE 3 - QUATERNARY FAULTS MAP

PROJECT
OTK-2022-016

DATE
JUNE 2025

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APPENDIX B

Interpreted Summary Exploration Logs
Results of Laboratory Testing

Interpreted Summary Exploration Logs

BORING NUMBER B-01

RhinoOne GEOTECHNICAL

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA
DATE STARTED 9/26/22 **COMPLETED** 9/26/22
NORTH _____ **EAST** _____
DRILLING CONTRACTOR Crisman Pacific Strata Drilling L.L.C.
GROUND ELEVATION 21 ft (See note) **HOLE SIZE** 4 inches
DRILLING METHOD Mud Rotary with Auto Hammer
GROUND WATER LEVELS:
LOGGED BY PH **CHECKED BY** LG
▽ **AT TIME OF DRILLING** 5.00 ft / Elev 16.00 ft (Estimate)
NOTES Surface elevation estimated using Google Earth (WGS84 geoid)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0.0		Sandy Gravel (Roadway Baserock, 12-inches)					
		Poorly-graded SAND with trace silt; SP; Grey with brown mottling; Moist to wet; Loose; Fine to medium grained sand; Contains trace organics [Beach Deposits]					
2.5			SPT 1	50	2-2-3 (5)		
5.0		▽	SPT 2	39	2-2-2 (4)		
7.5		Poorly-graded SAND with some silt; SP-SM; Grey; Wet; Very loose to medium dense; Fine to medium grained sand	SPT 3	6	0-1-1 (2)		
10.0			SPT 4	83	3-4-6-13 (10)		
12.5			SPT 5	100	8-12-12 (24)		
15.0							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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GEOTECH BH PLOTS - OR_DOT 08272015.GDT - 6/16/25 11:24 - P:\TECHNICAL\GINT INFO\BENTLEY\GINT\PROJECTS\OTK-2022-016 CAPE DISSAPOINTMENT STATE PARK.GPJ

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
15.0		Poorly-graded SAND with some silt; SP-SM; Grey; Wet; Dense to very dense; Fine to medium grained sand	SPT 6	78	11-14-17 (31)		
17.5			SPT 7	72	11-22-33 (55)		
20.0			SPT 8	89	9-15-17 (32)		
22.5							
25.0			SPT 9	89	13-15-17 (32)		
27.5		Poorly-graded SAND with some silt and trace gravel; SP-SM; Grey; Wet; Dense; Fine to medium grained sand; fine to coarse grained rounded gravel					
30.0			SPT 10	100	12-18-18 (36)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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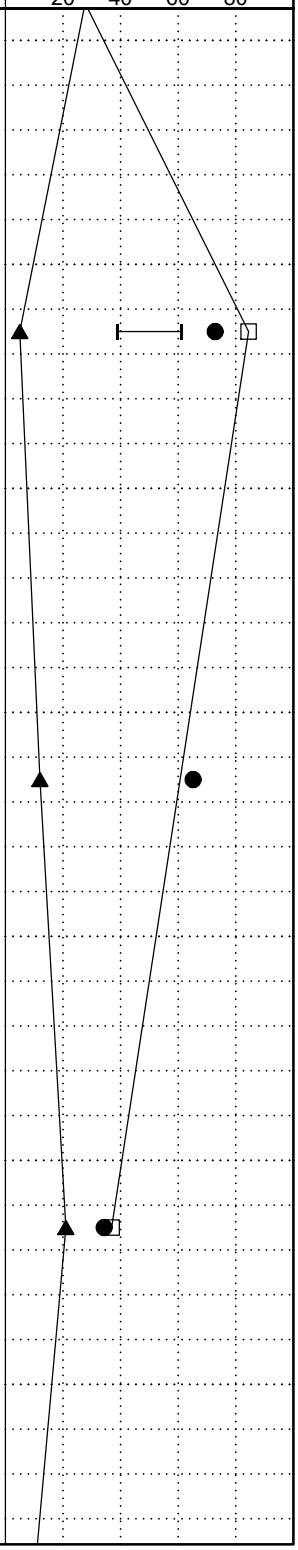
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CLIENT Otak Inc. / Washington State Parks **PROJECT NAME** Welcome Center and Entrance Improvement Project

PROJECT NUMBER OTK-2022-016 **PROJECT LOCATION** Cape Disappointment State Park, Ilwaco, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
32.5		Poorly-graded SAND with some silt and trace gravel; SP-SM; Grey; Wet; Dense; Fine to medium grained sand; fine to coarse grained rounded gravel *(continued)*					
		Elastic SILT with some sand; MH; Grey; High plasticity; Medium stiff; Contains trace organics; Estuarine deposits					
35.0			SPT 11	100	2-2-3 (5)		
37.5							
40.0			SPT 12	100	2-4-8 (12)		
		Clayey SAND; SC; Grey; Wet; Medium dense; Fine to coarse grained sand; Estuarine deposits					
42.5							
45.0			SPT 13	100	5-9-12 (21)		
		Elastic SILT; MH; Blue-grey; High plasticity; Wet; Medium stiff to very stiff; Decomposed siltstone/sandstone [Crescent Formation]					
47.5							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



(Continued Next Page)

RhinoOne GEOTECHNICAL

BORING NUMBER B-01

CLIENT Otak Inc. / Washington State Parks

PROJECT NAME Welcome Center and Entrance Improvement Project

PROJECT NUMBER OTK-2022-016

PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
50.0		Elastic SILT; MH; Blue-grey; High plasticity; Wet; Medium stiff to very stiff; Decomposed siltstone/sandstone [Crescent Formation] *(continued)*	SPT 14		0-1-6 (7)			▲ ●

Bottom of borehole at 51.5 feet.

GEOTECH BH PLOTS - OR_DOT 08272015.GDT - 6/16/25 11:24 - P:\TECHNICAL\GINT INFO\BENTLEY\GINT\PROJECTS\OTK-2022-016 CAPE DISSAPOINTMENT STATE PARK.GPJ

BORING NUMBER B-02

RhinoOne GEOTECHNICAL

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA
DATE STARTED 9/26/22 **COMPLETED** 9/26/22
NORTH ___ **EAST** ___
DRILLING CONTRACTOR Crisman Pacific Strata Drilling L.L.C.
GROUND ELEVATION 21 ft (See note) **HOLE SIZE** 4 inches
DRILLING METHOD Mud Rotary with Auto Hammer
GROUND WATER LEVELS:
LOGGED BY PH **CHECKED BY** LG
▽ **AT TIME OF DRILLING** 7.50 ft / Elev 13.50 ft (Estimate)
NOTES Surface elevation estimated using Google Earth (WGS84 geoid)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0.0		Asphalt Cement Concrete (3-inches)					
		Sandy Gravel (Roadway Baserock, 9-inches)					
		Poorly-graded SAND with trace to some silt; SP/SP-SM; Dark brown; Damp to wet; Medium dense; Fine to medium grained sand [Beach Deposits]					
2.5			SPT 1	56	8-9-15 (24)		
5.0			SPT 2	67	8-10-11 (21)		
7.5		▽ Becomes Dark grey	SPT 3	56	5-6-7 (13)		
10.0			SPT 4		5-7-9 (16)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 11.5 feet.

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BORING NUMBER B-03

RhinoOne GEOTECHNICAL

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA
DATE STARTED 9/26/22 **COMPLETED** 9/26/22
NORTH **EAST**
DRILLING CONTRACTOR Crisman Pacific Strata Drilling L.L.C.
GROUND ELEVATION 20 ft (See note) **HOLE SIZE** 4 inches
DRILLING METHOD Mud Rotary with Auto Hammer
GROUND WATER LEVELS:
LOGGED BY PH **CHECKED BY** LG
▽ **AT TIME OF DRILLING** 2.50 ft / Elev 17.50 ft (Estimate)
NOTES Surface elevation estimated using Google Earth (WGS84 geoid)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0.0		TOPSOIL					
		Poorly-graded SAND with trace silt; SP; Brown to grey; Wet; Loose to medium dense [Beach Deposits]					
2.5		▽	SPT 1	72	2-3-3 (6)		
5.0			SPT 2	78	2-4-6 (10)		
7.5			SPT 3	72	2-3-5 (8)		
10.0		Poorly-graded SAND with some silt; SP-SM; Dark grey to grey; Wet; Medium dense to dense; Fine to medium grained sand	SPT 4	89	4-10-16 (26)		
12.5			SPT 5	89	12-16-20 (36)		
15.0							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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BORING NUMBER B-03

RhinoOne GEOTECHNICAL

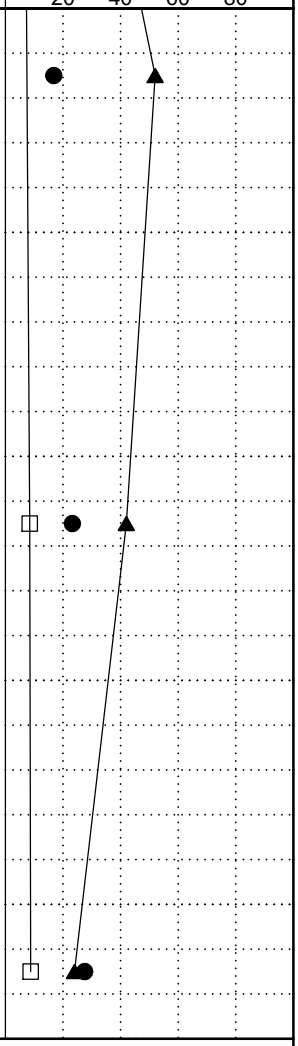
CLIENT Otak Inc. / Washington State Parks **PROJECT NAME** Welcome Center and Entrance Improvement Project

PROJECT NUMBER OTK-2022-016 **PROJECT LOCATION** Cape Disappointment State Park, Ilwaco, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
15.0		Poorly-graded SAND with some silt; SP-SM; Dark grey to grey; Wet; Medium dense to dense; Fine to medium grained sand *(continued)*	SPT 6	89	14-22-30 (52)		
17.5							
20.0			SPT 7	100	10-19-23 (42)		
22.5							
25.0		Poorly-graded GRAVEL with some silt and some sand; GP-GM; Grey; Wet; Medium dense; Fine to coarse grained sand; Fine grained angular gravel	SPT 8	100	11-15-9 (24)		
		Fat CLAY; CH; Brown; High plasticity; Estuarine deposits					

Bottom of borehole at 26.5 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



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BORING NUMBER B-04

RhinoOne GEOTECHNICAL

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA
DATE STARTED 9/26/22 **COMPLETED** 9/26/22
NORTH ___ **EAST** ___
DRILLING CONTRACTOR Crisman Pacific Strata Drilling L.L.C.
GROUND ELEVATION 20 ft (See note) **HOLE SIZE** 4 inches
DRILLING METHOD Mud Rotary with Auto Hammer
GROUND WATER LEVELS:
LOGGED BY PH **CHECKED BY** LG
▽ **AT TIME OF DRILLING** 2.50 ft / Elev 17.50 ft (Estimate)
NOTES Surface elevation estimated using Google Earth (WGS84 geoid)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0.0		Sandy Gravel (Roadway Baserock, 6-inches)					
		Poorly-graded SAND with trace silt; SP; Brown-grey; Wet; Very loose to medium dense; Fine to medium grained sand [Beach Deposits]					
2.5		▽	SPT 1	67	4-5-6 (11)		
5.0		Becomes Grey	SPT 2	83	2-4-5 (9)		
7.5			SPT 3	72	2-1-3 (4)		
10.0		Poorly-graded SAND with some silt; SP-SM; Black; Wet; Medium dense; Fine grained sand	SPT 4	100	8-13-16 (29)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 11.5 feet.

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BORING NUMBER B-05

RhinoOne GEOTECHNICAL

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA
DATE STARTED 9/27/22 **COMPLETED** 9/27/22
NORTH ___ **EAST** ___
DRILLING CONTRACTOR Crisman Pacific Strata Drilling L.L.C.
GROUND ELEVATION 22 ft (See note) **HOLE SIZE** 4 inches
DRILLING METHOD Mud Rotary with Auto Hammer
GROUND WATER LEVELS:
LOGGED BY PH **CHECKED BY** LG
▽ **AT TIME OF DRILLING** 5.00 ft / Elev 17.00 ft (Estimate)
NOTES Surface elevation estimated using Google Earth (WGS84 geoid)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0.0		Asphalt Cement Concrete (4.5-inches)					
		Sandy Gravel (Roadway Baserock, 18-inches)					
2.5		Poorly-graded SAND with trace silt and gravel; SP; Brown; Moist; Loose [Beach Deposits]					
		Poorly-graded SAND with trace silt; SP; Grey; Moist to wet; Loose to medium dense	SPT 1	50	4-5-3-3 (8)		
5.0		▽	SPT 2	56	5-4-6 (10)		
7.5			SPT 3	67	3-3-6 (9)		
10.0		Poorly-graded SAND with some silt; SP-SM; Grey; Wet; Medium dense	SPT 4	61	5-9-9 (18)		

▲ SPT N VALUE ▲ (20 40 60 80)
PL MC LL (20 40 60 80)
☐ FINES CONTENT (%) ☐ (20 40 60 80)

Bottom of borehole at 11.5 feet.

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BORING NUMBER B-06

RhinoOne GEOTECHNICAL

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA
DATE STARTED 9/27/22 **COMPLETED** 9/27/22
NORTH _____ **EAST** _____
DRILLING CONTRACTOR Crisman Pacific Strata Drilling L.L.C.
GROUND ELEVATION 21 ft (See note) **HOLE SIZE** 4 inches
DRILLING METHOD Mud Rotary with Auto Hammer
GROUND WATER LEVELS:
LOGGED BY PH **CHECKED BY** LG
▽ **AT TIME OF DRILLING** 2.50 ft / Elev 18.50 ft (Estimate)
NOTES Surface elevation estimated using Google Earth (WGS84 geoid)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0.0		Asphalt Cement Concrete (2-inches)					
		Sandy Gravel (Roadway Baserock, 10-inches)					
		Poorly-graded SAND with trace silt; SP; Grey; Wet; Loose; Fine to medium grained sand; Contains organics (wood) [Beach Deposits]					
2.5		▽	SPT 1	56	4-3-7 (10)		
5.0			SPT 2	0	4-3-2-1 (5)		
7.5		Gravelly SAND with trace silt; SP; Grey; Wet; Loose; Contains organics (wood)	SPT 3	11	0-1-7 (8)		
10.0		Peaty SILT; OL; Brown; Low to medium plasticity; Wet; Very soft; Contains organics (wood); Estuarine deposits	SPT 4	17	0-0-1 (1)		
12.5		Poorly-graded SAND with some silt; SP-SM; Grey; Wet; Loose; Fine to medium grained sand; Includes a 2-inch layer of wood	SPT 5	67	1-2-3 (5)		
15.0							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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RhinoOne GEOTECHNICAL

BORING NUMBER B-06

CLIENT Otak Inc. / Washington State Parks

PROJECT NAME Welcome Center and Entrance Improvement Project

PROJECT NUMBER OTK-2022-016

PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
15.0		Poorly-graded SAND with some silt; SP-SM; Dark grey; Wet; Medium dense to very dense; Fine to medium grained sand	SPT 6	78	7-11-14 (25)		
17.5			SPT 7	89	12-21-32 (53)		
20.0			SPT 8	89	13-24-27 (51)		
22.5							
25.0			SPT 9	78	17-24-19 (43)		
27.5							
30.0		Poorly-graded SAND with some silt and some gravel; SP-SM; Grey; Wet; Dense; Fine to medium grained sand; Fine grained gravel; Contains some shells	SPT 10	100	14-20-21 (41)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

Bottom of borehole at 31.5 feet.

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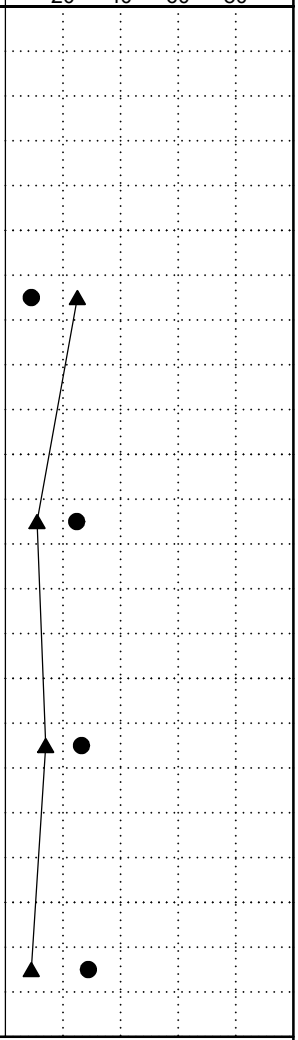
BORING NUMBER B-07

RhinoOne GEOTECHNICAL

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA
DATE STARTED 9/27/22 **COMPLETED** 9/27/22
NORTH **EAST**
DRILLING CONTRACTOR Crisman Pacific Strata Drilling L.L.C.
GROUND ELEVATION 21 ft (See note) **HOLE SIZE** 4 inches
DRILLING METHOD Mud Rotary with Auto Hammer
GROUND WATER LEVELS:
LOGGED BY PH **CHECKED BY** LG
▽ **AT TIME OF DRILLING** 5.00 ft / Elev 16.00 ft (Estimate)
NOTES Surface elevation estimated using Google Earth (WGS84 geoid)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0.0		Asphalt Cement Concrete (4-inches)					
		Sandy Gravel (Roadway Baserock, 14-inches)					
		Poorly-graded SAND with some gravel; SP; Brown; Moist; Medium dense; Fine to medium grained sand; Fine grained gravel [Beach Deposits]					
2.5		Poorly-graded SAND with trace silt; SP; Grey and brown; Wet; Loose to medium dense; Fine to medium grained sand	SPT 1	100	7-13-12 (25)		
5.0	▽		SPT 2	67	5-5-6 (11)		
7.5			SPT 3	44	3-6-8 (14)		
10.0			SPT 4	44	3-5-4 (9)		

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



Bottom of borehole at 11.5 feet.

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BORING NUMBER B-08

RhinoOne GEOTECHNICAL

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA
DATE STARTED 9/27/22 **COMPLETED** 9/27/22
NORTH ___ **EAST** ___
DRILLING CONTRACTOR Crisman Pacific Strata Drilling L.L.C.
GROUND ELEVATION 21 ft (See note) **HOLE SIZE** 4 inches
DRILLING METHOD Mud Rotary with Auto Hammer
GROUND WATER LEVELS:
LOGGED BY PH **CHECKED BY** LG
▽ **AT TIME OF DRILLING** 7.50 ft / Elev 13.50 ft (Estimate)
NOTES Surface elevation estimated using Google Earth (WGS84 geoid)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0.0		Sandy Gravel (Roadway Baserock, 9-inches)					
		Poorly-graded SAND with trace sand; SP; Grey; Moist to wet; Very loose to loose; Fine to medium grained sand [Beach Deposits]					
2.5			SPT 1	78	4-5-4 (9)		
5.0			SPT 2	44	2-2-1 (3)		
7.5		▽	SPT 3	78	2-3-6 (9)		
		Poorly-graded SAND with some sand; SP-SM; Brown; Wet; Loose to medium dense; Fine to medium grained sand; Contains organics (wood)					
10.0			SPT 4	56	4-6-7 (13)		

▲ SPT N VALUE ▲ (20 40 60 80)
PL MC LL (20 40 60 80)
☐ FINES CONTENT (%) ☐ (20 40 60 80)

Bottom of borehole at 11.5 feet.

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BORING NUMBER B-09

RhinoOne GEOTECHNICAL

CLIENT Otak Inc. / Washington State Parks
PROJECT NAME Welcome Center and Entrance Improvement Project
PROJECT NUMBER OTK-2022-016
PROJECT LOCATION Cape Disappointment State Park, Ilwaco, WA
DATE STARTED 9/27/22 **COMPLETED** 9/27/22
NORTH **EAST**
DRILLING CONTRACTOR Crisman Pacific Strata Drilling L.L.C.
GROUND ELEVATION 20 ft (See note) **HOLE SIZE** 4 inches
DRILLING METHOD Mud Rotary with Auto Hammer
GROUND WATER LEVELS:
LOGGED BY PH **CHECKED BY** LG
▽ **AT TIME OF DRILLING** 5.00 ft / Elev 15.00 ft (Estimate)
NOTES Surface elevation estimated using Google Earth (WGS84 geoid)
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
0.0		TOPSOIL					
		Poorly-graded SAND with trace silt; SP; Grey; Moist to wet; Medium dense; Fine to medium grained sand [Beach Deposits]					
2.5			SPT 1	89	3-5-7 (12)		
5.0		▽	SPT 2	89	4-5-9 (14)		
7.5			SPT 3	83	6-9-14 (23)		
10.0		Poorly-graded SAND with some silt; SP-SM; Dark grey; Wet; Very loose to dense; Fine to medium grained sand	SPT 4	89	10-15-19 (34)		
12.5			SPT 5	89	11-12-13 (25)		
15.0							

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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RhinoOne GEOTECHNICAL

BORING NUMBER B-09

CLIENT Otak Inc. / Washington State Parks **PROJECT NAME** Welcome Center and Entrance Improvement Project

PROJECT NUMBER OTK-2022-016 **PROJECT LOCATION** Cape Disappointment State Park, Ilwaco, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
15.0		Poorly-graded SAND with some silt; SP-SM; Dark grey; Wet; Very loose to dense; Fine to medium grained sand *(continued)*	SPT 6	72	3-3-1 (4)			
		Silty SAND; SM; Brown; Moist to wet; Dense; Fine to medium grained sand						
17.5			SPT 7	78	7-13-23 (36)			
20.0			SPT 8	78	12-20-26 (46)			

Bottom of borehole at 21.5 feet.

GEOTECH BH PLOTS - OR_DOT 08272015.GDT - 6/16/25 11:24 - P:\TECHNICAL\GINT INFO\BENTLEY\GINT\PROJECTS\OTK-2022-016 CAPE DISSAPOINTMENT STATE PARK.GPJ

Results of Laboratory Testing

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Laboratory Results
Oven Dry Moisture Content (ASTM D 2216)

Project Name:	Welcome Center and Entrance Improvement Project	Date:	22-Oct-22
Project Number:	OTK-2022-016	Tested By:	RA
Location:	Cape Disappointment State Park, Ilwaco, Washington	Laboratory Number:	2022-M0174

Exploration Designation	Depth Range (feet)			Tare Number	Weight of Tare (g)	Weight of Tare + Wet Soil (g)	Weight of Tare + Dry Soil (g)	Weight of Dry Soil (g)	Weight of Water (g)	Water Content by Weight
B-01	2.5	-	4	005	51.73	160.71	145.93	94.20	14.78	15.7%
B-01	5	-	6.5	011	51.61	173.79	144.72	93.11	29.07	31.2%
B-01	7.5	-	9	006	51.12	77.20	69.75	18.63	7.45	40.0%
B-01	10	-	11.5	008	51.82	192.22	160.47	108.65	31.75	29.2%
B-01	12.5	-	14	009	51.49	188.91	159.84	108.35	29.07	26.8%
B-01	15	-	16.5	010	51.56	173.33	157.84	106.28	15.49	14.6%
B-01	17.5	-	19	012	51.54	204.93	184.06	132.52	20.87	15.7%
B-01	20	-	21.5	014	51.22	198.42	169.15	117.93	29.27	24.8%
B-01	25	-	26.5	015	51.55	167.70	146.12	94.57	21.58	22.8%
B-01	30	-	31.5	016	51.66	171.48	147.66	96.00	23.82	24.8%
B-01	35	-	36.5	017	51.69	156.60	112.39	60.70	44.21	72.8%
B-01	40	-	41.5	018	51.58	157.38	115.63	64.05	41.75	65.2%
B-01	45	-	46.5	019	51.37	155.84	129.17	77.80	26.67	34.3%
B-01	50	-	51.5	020	51.76	155.27	128.15	76.39	27.12	35.5%
B-02	2.5	-	4	021	51.01	156.47	142.80	91.79	13.67	14.9%
B-02	5	-	6.5	022	51.79	162.82	146.59	94.80	16.23	17.1%
B-02	7.5	-	9	023	51.75	169.34	148.78	97.03	20.56	21.2%
B-02	10	-	11.5	024	51.70	171.75	148.25	96.55	23.50	24.3%
B-03	2.5	-	4	025	51.66	173.17	143.35	91.69	29.82	32.5%
B-03	5	-	6.5	028	51.48	155.48	129.04	77.56	26.44	34.1%
B-03	7.5	-	9	029	51.55	157.57	136.52	84.97	21.05	24.8%
B-03	10	-	11.5	030	51.67	150.04	130.13	78.46	19.91	25.4%
B-03	12.5	-	14	031	51.46	156.94	137.46	86.00	19.48	22.7%
B-03	15	-	16.5	032	50.88	187.83	168.14	117.26	19.69	16.8%

RhinoOne GEOTECHNICAL

Laboratory Results
Oven Dry Moisture Content (ASTM D 2216)

Project Name:	Welcome Center and Entrance Improvement Project	Date:	22-Oct-22
Project Number:	OTK-2022-016	Tested By:	RA
Location:	Cape Disappointment State Park, Ilwaco, Washington	Laboratory Number:	2022-M0174

Exploration Designation	Depth Range (feet)	Tare Number	Weight of Tare (g)	Weight of Tare + Wet Soil (g)	Weight of Tare + Dry Soil (g)	Weight of Dry Soil (g)	Weight of Water (g)	Water Content by Weight
B-03	20 - 21.5	036	51.17	151.35	132.45	81.28	18.90	23.3%
B-03	25 - 26.5	013	50.29	151.20	129.42	79.13	21.78	27.5%
B-04	2.5 - 4	026	51.94	150.54	130.06	78.12	20.48	26.2%
B-04	5 - 6.5	002	51.58	163.15	135.17	83.59	27.98	33.5%
B-04	7.5 - 9	003	51.25	154.72	129.45	78.20	25.27	32.3%
B-04	10 - 11.5	027	51.58	183.42	165.84	114.26	17.58	15.4%
B-05	2.5 - 4	007	51.72	150.18	143.61	91.89	6.57	7.1%
B-05	5 - 6.5	004	51.36	153.44	135.18	83.82	18.26	21.8%
B-05	7.5 - 9	001	51.25	181.13	152.31	101.06	28.82	28.5%
B-05	10 - 11.5	038	51.82	169.45	140.54	88.72	28.91	32.6%
B-06	2.5 - 4	033	50.88	151.98	135.02	84.14	16.96	20.2%
B-06	7.5 - 9	034	52.00	177.20	121.03	69.03	56.17	81.4%
B-06	10 - 11.5	005	51.73	104.85	86.65	34.92	18.20	52.1%
B-06	12.5 - 14	011	51.61	155.12	108.14	56.53	46.98	83.1%
B-06	15 - 16.5	006	51.16	191.76	167.85	116.69	23.91	20.5%
B-06	17.5 - 19	008	51.82	187.13	168.37	116.55	18.76	16.1%
B-06	20 - 21.5	009	51.49	166.45	146.88	95.39	19.57	20.5%
B-06	25 - 26.5	010	51.56	189.17	165.54	113.98	23.63	20.7%
B-06	30 - 31.5	012	51.56	152.51	133.22	81.66	19.29	23.6%
B-07	2.5 - 4	014	51.22	154.02	145.53	94.31	8.49	9.0%
B-07	5 - 6.5	015	51.55	156.25	135.47	83.92	20.78	24.8%
B-07	7.5 - 9	016	51.66	161.21	138.31	86.65	22.90	26.4%
B-07	10 - 11.5	017	51.69	156.42	133.00	81.31	23.42	28.8%
B-08	2.5 - 4	018	51.58	150.91	138.68	87.10	12.23	14.0%

RhinoOne GEOTECHNICAL

Laboratory Results
Oven Dry Moisture Content (ASTM D 2216)

Project Name:	Welcome Center and Entrance Improvement Project	Date:	22-Oct-22
Project Number:	OTK-2022-016	Tested By:	RA
Location:	Cape Disappointment State Park, Ilwaco, Washington	Laboratory Number:	2022-M0174

Exploration Designation	Depth Range (feet)			Tare Number	Weight of Tare (g)	Weight of Tare + Wet Soil (g)	Weight of Tare + Dry Soil (g)	Weight of Dry Soil (g)	Weight of Water (g)	Water Content by Weight
B-08	5	-	6.5	019	51.37	150.70	132.43	81.06	18.27	22.5%
B-08	7.5	-	9	020	51.76	164.27	140.89	89.13	23.38	26.2%
B-08	10	-	11.5	021	51.01	166.10	143.31	92.30	22.79	24.7%
B-09	2.5	-	4	022	51.79	154.47	140.59	88.80	13.88	15.6%
B-09	5	-	6.5	023	51.75	177.89	159.34	107.59	18.55	17.2%
B-09	7.5	-	9	024	51.70	151.09	132.91	81.21	18.18	22.4%
B-09	10	-	11.5	025	51.66	153.00	135.82	84.16	17.18	20.4%
B-09	12.5	-	14	026	51.48	150.06	135.51	84.03	14.55	17.3%
B-09	15	-	16.5	038	51.67	160.37	141.32	89.65	19.05	21.2%
B-09	17.5	-	19	028	51.48	157.63	134.31	82.83	23.32	28.2%
B-09	20	-	21.5	029	51.55	151.12	133.43	81.88	17.69	21.6%

RhinoOne GEOTECHNICAL

Laboratory Results
Standard Test Method for Particle-Size Distribution of Soils (ASTM D 6913)

Project Name:	Welcome Center and Entrance Improvement Project	Date:	2-Oct-22
Project Number:	OTK-2022-016	Tested By:	PH/HH
Location:	Cape Disappointment State Park, Ilwaco, Washington	Laboratory Number:	2022-P0174

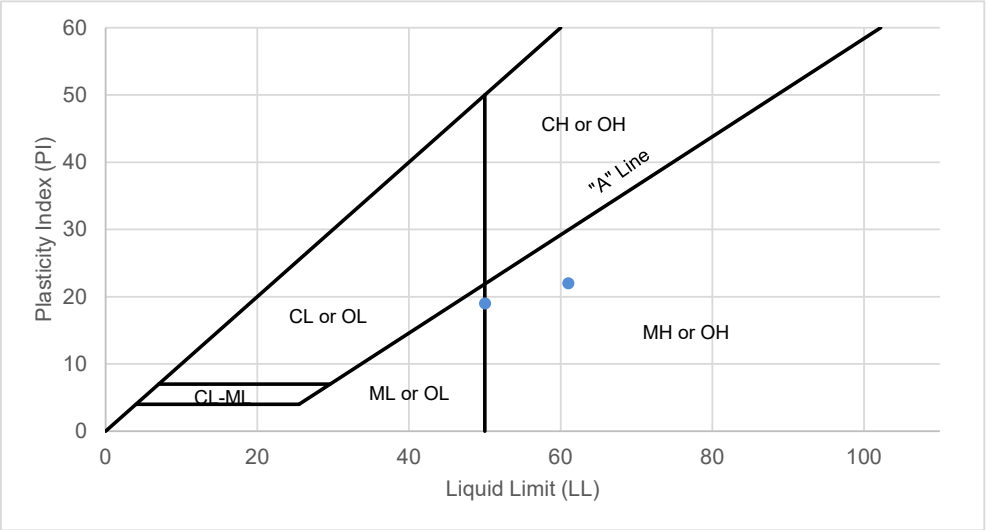
Exploration Designation	Depth Range (feet)	Tare Number	Weight of Tare (g)	Weight of Tare + Wet Soil (g)	Weight of Tare + Dry Soil (g)	Weight of Dry Soil (g)	Weight of Water (g)	Water Content by Weight	Post Wash				
									Weight of Dry Soil > #4	Weight of Dry Soil > #200	Percent Gravels	Percent Sands	Percent Fines
B-01	2.5 - 4	H	193.80	387.41	359.36	165.56	28.05	16.9%	0.00	158.24	0.0%	95.6%	4.4%
B-01	10 - 11.5	F	194.57	446.46	377.87	183.30	68.59	37.4%	0.00	171.71	0.0%	93.7%	6.3%
B-01	15 - 16.5	D	193.47	472.81	425.10	231.63	47.71	20.6%	0.00	206.57	0.0%	89.2%	10.8%
B-01	20 - 21.5	K	185.69	448.13	399.23	213.54	48.90	22.9%	0.00	193.63	0.0%	90.7%	9.3%
B-01	30 - 31.5	L	192.82	524.06	461.80	268.98	62.26	23.1%	15.47	250.28	5.8%	87.3%	7.0%
B-01	35 - 36.5	P	192.76	311.92	257.58	64.82	54.34	83.8%	0.00	10.12	0.0%	15.6%	84.4%
B-01	45 - 46.5	H	193.56	355.11	315.74	122.18	39.37	32.2%	0.00	77.14	0.0%	63.1%	36.9%
B-03	5 - 6.5	E	196.26	413.41	363.02	166.76	50.39	30.2%	0.00	161.57	0.0%	96.9%	3.1%
B-03	10 - 11.5	K	185.97	469.64	426.90	240.93	42.74	17.7%	0.00	225.27	0.0%	93.5%	6.5%
B-03	20 - 21.5	P	192.99	460.94	406.91	213.92	54.03	25.3%	0.00	195.75	0.0%	91.5%	8.5%
B-03	25 - 26.5	J	193.29	426.13	374.38	181.09	51.75	28.6%	115.71	165.24	63.9%	27.4%	8.8%
B-06	7.5 - 9	R	192.83	447.09	394.38	201.55	52.71	26.2%	101.86	192.96	50.5%	45.2%	4.3%
B-06	12.5 - 14	C	196.45	330.47	299.71	103.26	30.76	29.8%	0.00	96.43	0.0%	93.4%	6.6%
B-06	18 - 18.5	D	193.77	494.02	455.71	261.94	38.31	14.6%	0.00	248.71	0.0%	94.9%	5.1%
B-06	25 - 26.5	L	193.04	445.22	396.75	203.71	48.47	23.8%	0.00	184.64	0.0%	90.6%	9.4%
B-06	31 - 31.5	F	194.61	485.49	433.94	239.33	51.55	21.5%	47.46	220.72	19.8%	72.4%	7.8%
B-09	5 - 6.5	N	193.26	496.61	442.36	249.10	54.25	21.8%	0.00	238.15	0.0%	95.6%	4.4%
B-09	10 - 11.5	M	193.49	454.16	411.01	217.52	43.15	19.8%	0.00	200.35	0.0%	92.1%	7.9%
B-09	15 - 16.5	B	195.88	435.77	380.65	184.77	55.12	29.8%	0.00	175.09	0.0%	94.8%	5.2%
B-09	20 - 21.5	Q	193.68	451.67	401.40	207.72	50.27	24.2%	0.00	176.95	0.0%	85.2%	14.8%

RhinoOne GEOTECHNICAL

Laboratory Results
Oven Dry Moisture Content (ASTM D 2216)

Project Name:	Welcome Center and Entrance Improvement Project	Date:	TBD
Project Number:	OTK-2022-016	Tested By:	ACS Lab # TBD
Location:	Cape Disappointment State Park, Ilwaco, Washington	Lab Number:	2022-Att0174

Exploration Designation	Depth Range (feet)	Liquid Limit	Plastic Limit	Plasticity Index	Symbol	Plasticity
B-01	35 - 36.5	61	39	22	MH	H
B-01	50 - 51.5	50	31	19	MH	H



Note: Graphical representation of testing conducted by Others, See Attached for test results

ASPHALT CONCRETE SOILS TESTING, INC
503.443.3799

7409 SW Tech Center Drive - Suite 145
Tigard, OR 97223
Phone: (503) 443-3799 Fax: (503) 620-2748

RHINO ONE GEOTECHNICAL
4610 NE 77TH AVE #126
VANCOUVER, WA 98662

PROJECT:	2022 LAB SERVICES
LOCATION:	CAPE DISAPPOINTMENT
MATERIAL:	VARIOUS
SAMPLE SOURCE:	VARIOUS

JOB NO:	22-L006
WORK ORDER NO:	OTK-2022-016
LAB NO:	14236
DATE RECEIVED:	10/13/2022

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS (ASTM D4318)

SAMPLE ID	LIQUID LIMIT	PLASTIC LIMIT	PI
TB-01, 35-36.5'	61	39	22
TB-01, 50-51.5'	50	31	19

Reviewed by:

SECTION 010000 – GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SPECIAL NOTICE(S)

A. Cape Disappointment State Park is closing for construction beginning September 17th 2025 and will reopen April 1st 2026. Construction needs to be completed by March 31, 2026.

1.2 DESCRIPTION OF WORK

A. Construction of a new entrance area to Cape Disappointment State Park in Pacific County. The project work includes a new Welcome Center, expansion of the administrative/shop facility, a new visitor parking lot, improvements to entrance circulation and pedestrian safety, relocation of the compaction dumpster, and construction of a trail system. Improvements will establish circulation for vehicles and pedestrians and address traffic safety, free flow of traffic into and out of the park, and provide new parking options for cars, RVs, and trucks with trailers.

1.3 TIME FOR COMPLETION OF PROJECT

A. Substantially complete project in accordance with the drawings and specifications within 120 calendar days from date on Notice to Proceed letter. Final completion in accordance with Contract Documents within 30 calendar days from substantial completion date.

1.4 HOURS OF WORK

A. Work hours are between 7:00 a.m. and & 8:00 p.m. Monday through Friday, excluding national holidays.

B. No onsite work shall be performed during federal holiday periods unless written authorization is given by the Owner's Representative.

1.5 LIQUIDATED DAMAGES

A. If Contractor fails to complete Contract within stipulated time, an assessment of $500 per day will be made against Contractor for each additional day required to complete contract, unless an extension of time was granted through Change Order. This assessment is to cover Commission's liquidated damages and is not to be construed as a penalty.

B. Contract authorizes the Washington State Parks and Recreation Commission to deduct liquidated damages from money due at completion of contract.

1.6 PRE-CONSTRUCTION CONFERENCE

A. Following notification of award to Contractor, the date for an on-site pre-construction conference will be set. Do not commence Work prior to conference or until written clearance has been obtained from Project Representative.

B. Furnish Project Representative with following:

1. Complete list of sub-contractors, including business address, telephone numbers, items of Work, and registration numbers. List is to be updated during contract life.
2. Name and contact information of Contractor's staff who is in charge and responsible for site safety and will be on site at all times.
3. A Site-Specific Safety Plan that is in compliance with the Department of Labor and Industries and 000011 – General Conditions specifically for this project.
4. A progress schedule in accordance with General Conditions.
5. A detailed cost breakdown for lump sum bid items. Furnish a fair evaluation of actual cost of each items of Work listed. This will be used in processing Contractor's requests for partial payment. Submittal of breakdown does not affect the Contract terms.
6. Written document detailing plans to comply with 15 percent Apprenticeship Participation requirement stated in Instruction to Bidders 4.1B.

C. Project Representative will supply a list of hazardous products that could be encountered on Project. Appropriate Safety Data Sheet (SDS) will be on file at park.

1.7 PROGRESS CLEANING

A. Remove rubbish and debris from park property daily unless otherwise directed. Do not allow accumulation. Store materials that cannot be removed daily only in areas specified by the Project Representative.

B. Maintain worksites in a neat and orderly condition.

C. Cleanup operations are incidental to the Contract and no extra compensation will be made.

1.8 AS-BUILT DRAWINGS

A. Keep a clean set of full-sized drawings at job site to use to identify changes.

1.9 PROJECT CONDITIONS

A. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Project Representative and Owner. Owner will remove hazardous materials under a separate contract.

1.10 PROJECT SIGN

A. Provide following temporary sign. Sign location is shown on drawings or determined by Project Representative. Upon Project completion, remove sign and restore area to original condition.

1.2 PROJECT SIGN LETTERING

TITLE OF PROJECT:	WELCOME CENTER AND ENTRANCE IMPROVEMENTS
NAME OF FACILITY:	CAPE DISAPPOINTMENT STATE PARK
NAME OF CONTRACTOR:	(Place Contractor's Name here)
ADDRESS OF CONTRACTOR:	(Place Contractor's Address here)
FUNDING TITLE NUMBER 1:	STATE BUILDING CONSTRUCTION ACCOUNT
FUNDING TITLE NUMBER 2:	(LEAVE BLANK FOR THIS PROJECT)

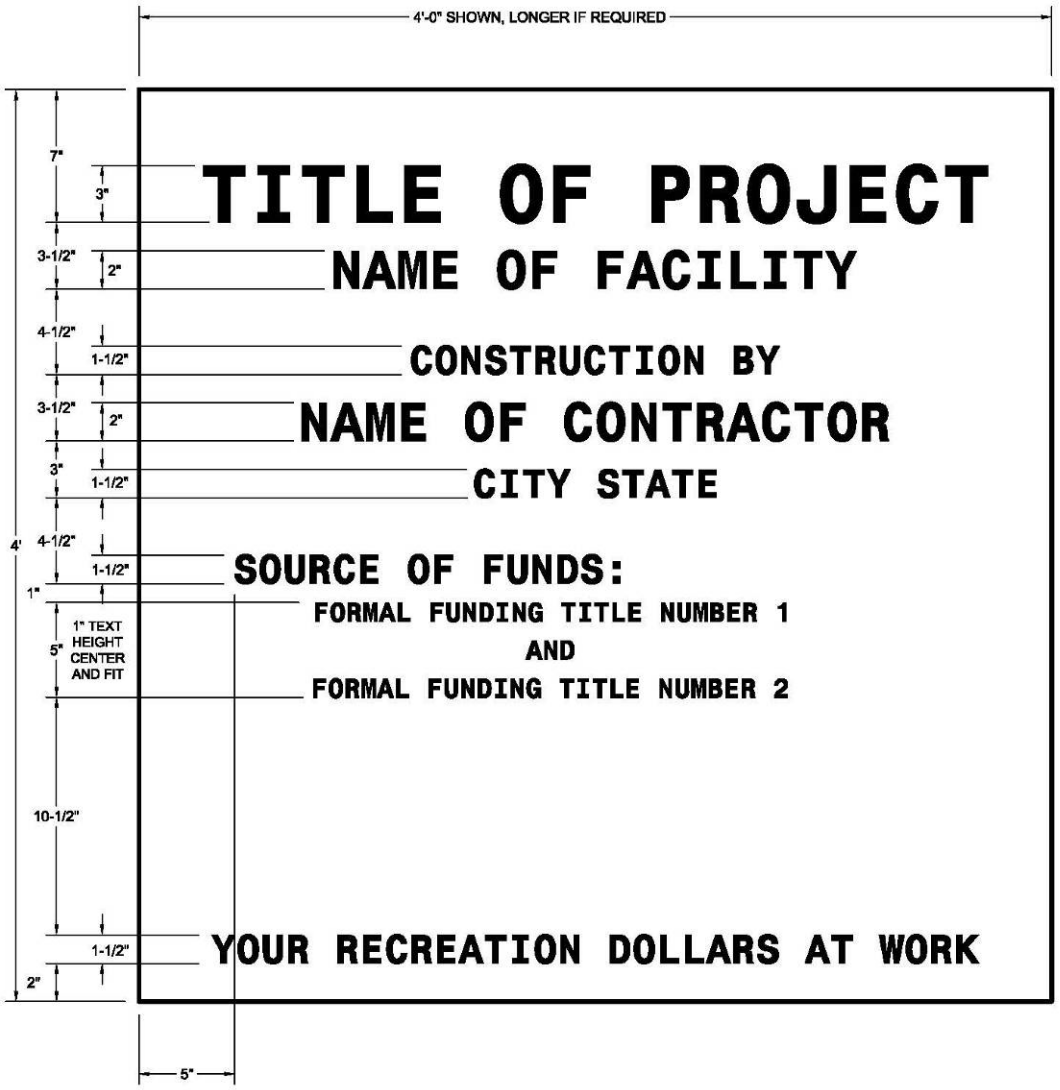
1.11 PARTNERSHIP IN THE CONTRACT

A. As partners in this contract, both Contractor and Commission recognize the value of a successful Project. Both parties recognize, besides the tangible benefits to Contractor and the Commission, the citizens of Washington State and visitors to Washington State Parks will benefit immensely from the successful completion of a quality Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

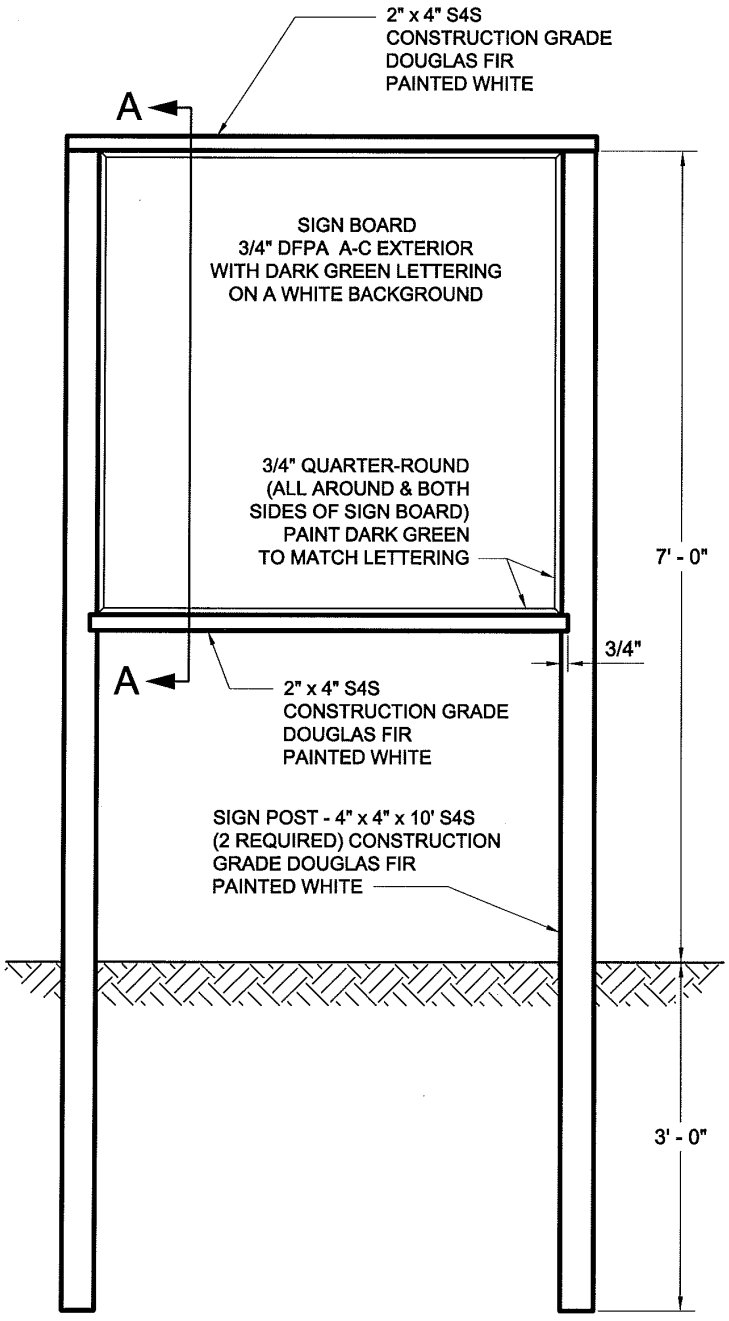
PROJECT SIGN DETAIL



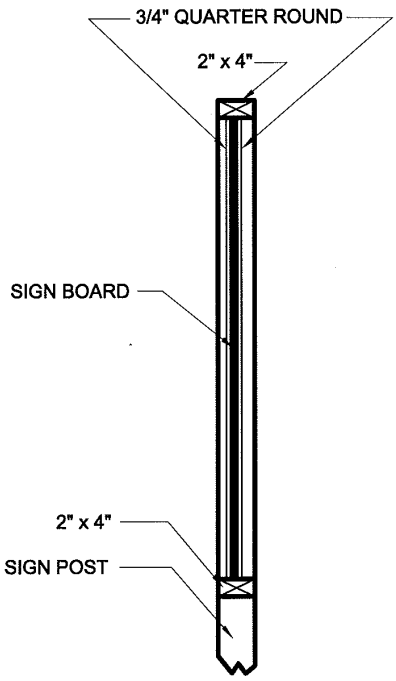
LAY OUT SIGN TO FIT ON A PORTION OF ONE (1) SHEET OF PLYWOOD. IF PLYWOOD IS THE FINAL SURFACE, PAINT IT WITH TWO (2) OR MORE COATS OF WHITE PAINT TO FORM A SMOOTH, NONABSORBENT SURFACE. PROVIDE DARK GREEN WELL FORMED LETTERS, EVENLY SPACED, NEAT IN APPEARANCE, AND ALIGNED AS SHOWN ABOVE.

WASHINGTON STATE PARKS
PROJECT SIGN DETAIL

PROJECT SIGN DETAIL



PLAN



SECTION A - A

END OF SECTION

SECTION 010099 – SURVEYING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Set and maintain alignment and grades necessary for construction; including clearing limits, grading, utilities, roads, trails, and structures. Except for the data specified to be furnished by the Owner, the Contractor is responsible for calculations, surveying materials and measuring required for setting and maintaining the necessary lines and grades. Furnish copies of calculations and staking data, when requested by Project Representative. AutoCAD design data will be supplied by the State.

B. Staking requirements that do not fit field conditions will be reviewed and, if necessary, adjusted by the Engineer. Revisions to the staking information will be provided for completing the work.

1.2 SURVEY CONTROL AND DATA

A. To facilitate establishment of lines and elevations, Owner will furnish the following survey control and data:

1. Elevation benchmarks, and horizontal control points, for one time only.
2. Provide technical advice, if requested.

B. Give three weeks' notice to allow adequate time to provide data.

1.3 TOLERANCES

A. Ensure accuracy of line and elevations within a tolerance of 0.01 foot.

B. Set subgrade blue tops and surfacing red and yellow tops at 50 foot intervals in tangent sections, 25 foot intervals in curve sections and 10 foot intervals in intersection radii.

C. In disputes concerning line and elevation accuracy, resolve dispute to Project Representative's satisfaction. Correct discrepancies before proceeding. No additional time or compensation will be provided for corrective work.

1.4 PAYMENT

A. Lump sum price for "Surveying" includes full pay costs for labor, tools, survey instruments, materials, other equipment, and traffic control necessary for the setting and maintaining horizontal locations and grades as specified.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013233 – PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.

B. See Section 017700 – Closeout Procedures for submitting digital media as Project Record Documents at Project closeout.

1.2 SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.

B. Construction Photographs: Submit one print of each photographic view within seven days of taking photographs.

1. Format: 8-by-10-inch (or 8-12-by-11-inch) smooth-surface matte prints on single-weight commercial-grade photographic paper, or 20-pound bond stock. If 8-by-10 inch paper is used, mount it on linen or card stock to allow a 1-inch- wide margin, punched for standard 3-ring binder.
2. Identification: On back of each print, provide the following information:

a. Name of Project.
b. Name and address of photographer.
c. Name of Contractor.
d. Date photograph was taken if not date stamped by camera.
e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
f. Unique sequential identifier.

3. Digital Images: Submit a complete set of digital image electronic files (TIFF or other owner approved format) with each submittal of prints and as a Project Record Document on CD or thumb drive. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

1.3 COORDINATION

A. Auxiliary Services: If the Contractor is not the photographer, cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary

facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.4 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1600 by 1200 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in filename for each image.
2. Field Office Images: Maintain one set of image prints and images on CD or thumb drive in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Project Representative.

C. Preconstruction Photographs: Before starting construction, take color, digital photographs of Project site and surrounding properties, that may be impacted by the Work, including existing items to remain during construction, from different vantage points, as directed by Project Representative.

1. Flag excavation areas and construction limits before taking construction photographs.
2. Take as many photographs as necessary but no less than eight to show existing conditions adjacent to the Work before starting the Work.
3. Take as many photographs as necessary but no less than eight photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction. Also, document access route within park.

D. Periodic Construction Photographs: Take as many photographs as necessary but no less than 12 color, digital photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Additional Photographs: Project Representative may requests additional photographs to adequately show the work. Additional photographs are considered incidental to the work and the Contractor will not receive additional compensation.

1. Three days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:

    a. Photographs to be taken at fabrication locations away from Project site.
    b. Substantial Completion of a major phase or component of the Work.
    c. Extra record photographs at time of final acceptance.

END OF SECTION

SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 WORK IN THIS SECTION

A. General: The types of submittal requirements specified in this Section include Shop Drawings, product data, Samples, and miscellaneous Work-related submittals. Specialized submittal requirements are specified in applicable Sections for each unit of Work. Refer to other Division 01 Sections and other Contract documents for requirements of administrative submittals.

B. Definitions: Work-related submittals of this Section are categorized for convenience as follows:

1. Shop Drawings: Specially-prepared technical data for this Project, including Drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements, and similar information not in standard printed form for general application to several projects.
2. Product Data: Standard printed information on materials, products, and systems; not specially-prepared for this Project, other than the designation of selections from among available choices printed therein.
3. Samples: Fabricated and unfabricated physical examples of materials, products, and units of Work; both as completed units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis.
4. Miscellaneous: Submittals related directly to the Work (non-administrative) include warranties, informational, maintenance agreements, workmanship bonds, Project photographs, survey data and reports, physical Work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock, and similar information, devices and materials applicable to the Work and not processed as Shop Drawings, product data or Samples. See Specification Sections.

1.2 RELATED REQUIREMENTS

A. General Conditions 4.03

B. Section 014000 – Quality Requirements

C. Section 017700 – Closeout Procedures

1.3 GENERAL SUBMITTAL REQUIREMENTS

A. Coordination and Sequencing: Coordinate preparation and processing of submittals with performance of the Work so that Work will not be delayed by submittals. Coordinate and sequence different categories of submittals for same Work, and for interfacing units of Work, so that one will not be delayed for coordination with another.

B. Preparation of Submittals: Provide permanent marking on, or with, each submittal to identify Project, date, Contractor, sub-contractor, submittal name and similar information to distinguish it from other submittals.

1.4 SPECIFIC SUBMITTAL REQUIREMENTS

A. General:

1. Except as otherwise indicated in individual Work Sections, comply with requirements specified herein for each indicated category of submittal.
2. Provide and process intermediate submittals, where required between initial and final, similar to initial submittals.
3. Include a transmittal with all submittals.

B. Shop Drawings:

1. General: No claims for extras may be initiated, based on Work shown on Shop Drawings.
2. Where Work of more than one sub-contractor is involved, submit composite Drawings, clearly defining the Work of each separate sub-contractor.
3. No extension of time in respect to the final completion date of building will be granted to Contractor because of failure to have any Shop Drawings submitted in ample time to allow for checking.
4. Verify all dimensions by taking field measurements. Do not begin Work until required submittals have been returned by the Engineer with stamp and initials indicating review. If Work has been done which is contrary to the approved Drawings, it will be corrected at no additional cost to the Commission. Maintain one complete set of shop drawings at the site for use by the Engineer.
5. Submit four (4) copies. Engineer will retain two (2) copies and return two (2) copies.

C. Product Data:

1. General:

a. Collect required data into one submittal for each unit of Work or system; and mark each copy to show which choices and options are applicable to Project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked, and modify details as required for application into the Work. Include color selection information where necessary.
b. Do not proceed with installation of materials, products or systems until final copy of applicable product data is in possession of Installer. Maintain one complete set of product data at the site for use by Project Representative.

1. Preparation and Processing: Do not submit product data, or allow its use on the Project, until compliance with requirements of Contract documents has been confirmed by Contractor. Submittal is for information and record, unless otherwise indicated. Initial submittal is final submittal unless returned by Engineer, marked with an "Action" which indicates an observed noncompliance.
2. Submit four (4) copies. Engineer will retain two (2) copies and return two (2) copies to the Contractor.

D. Samples:

1. General: Provide units identical with final condition of proposed materials or products for the Work. Include "range" Samples (not less than three (3) units) where there are unavoidable variations between units of each set. Provide full set of optional Samples where Engineer's selection is required. Prepare Samples to match Engineer's sample where indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture, and "kind" by Engineer. Engineer will not "test" Samples (except as otherwise indicated) for compliance with other requirements, which are, therefore, for exclusive responsibility of the Contractor.
2. Processing: Submit two (2) sets of Samples for Engineer's review and "Action"; one (1) set will be returned. Large Samples, which may be incorporated into the Work, may be submitted singly.
3. Reusable Samples: Returned Samples which are intended or permitted to be incorporated in the Work are so indicated in the individual Work sections, and must be in undamaged condition at time of use.

E. Warranties and Guarantees: In addition to copies desired for Contractor's use, furnish three (3) executed copies, except furnish additional copies where required for maintenance manuals.

F. Survey Data: Refer to other Sections for specific general requirements on property surveys, field measurements, quantitative records of actual Work, damage surveys, photographs and similar data required by individual Work Sections of these specifications. None of specified copies will be returned.

1.5 ACTION ON SUBMITTALS

A. Engineer's Action: Engineer will review each submittal, mark with "Action", and where possible return within two (2) weeks of receipt. Where submittal must be held for coordination, they will be returned to the Contractor within two (2) weeks of receipt for the Contractor to resubmit when it is appropriate.

1. Final Unrestricted Release: Work may proceed, provided it complies with Contract documents, when submittal is returned with marking: "Approved as Submitted".
2. Final-But-Restricted Release: Work may proceed, provided it complies with notations and corrections on submittal and with Contract documents, when submittal is returned with the marking: "Approved as Noted".
3. Returned and Rejected: Do not proceed with Work. Submittal item is not acceptable and may not be used on the Project when noted as "Not Approved".

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013501 – INADVERTENT DISCOVERIES OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

PART 1 - GENERAL

1.1 PROJECT SPECIFIC REQUIREMENTS

A. No cultural resource sites are known to exist within Work area. However, there always exist the potential for unanticipated discoveries during excavation work.

1.2 EMERGENCY CONTACTS

WSPRC Archaeologists
Jennifer Wilson, Archaeology Program Manager (360) 787-6511 (cell)
Shari Silverman, Archaeologist (360) 902-8631 (office)
Sarah DuBois, Archaeologist (509) 665-4336 (office)
Sean Stcherbinine, Archaeologist NW Region Email: sean.stcherbinine@parks.wa.gov

WSPRC Curator of Collections/NAGPRA Specialist
Alicia L. Woods, Statewide Curator of Collections & NAGPRA Specialist (360) 586-0206 (office)

State Physical Anthropologist
Guy Tasa, PhD, Dept. of Archaeology and Historic Preservation (360) 790-1633 (cell)

Assistant State Physical Anthropologist
Alex Garcia-Putnam, Dept. of Archaeology and Historic Preservation (360) 890-2633 (cell)

County Coroner/Examiner
David Burke – Prosecuting Attorney/Coroner (360) 875-98586

Area Manager
Evan Roberts – Long Beach Area State Parks – Park Manager (360) 642-3078

Region Manager
Miles Wenzel (360) 725-9770

Local Law Enforcement (if can't get ahold of any park staff)
Pacific County Sherriff – Daniel Garcia (360) 642-9395

1.3 INADVERTENT DISCOVERIES OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

A. Many of Washington's most important heritage sites reside on lands owned or managed by the Washington State Parks and Recreation Commission (WSPRC). Nearly all Washington State Parks contain one or more important historic buildings, structures, or archaeological sites. For this reason, archaeological surveys and historic building inventories are ordinarily

commissioned as a part of background analysis and information gathering for park developments and undertakings. Results of these surveys are used during project planning to ensure every effort is made to avoid impacts to cultural resources. Yet, despite these efforts, there **always** remains some potential for unanticipated discoveries while working in Washington State Parks.

B. All unanticipated discoveries, both cultural resources and human skeletal remains, are subject to all applicable federal and state statues, regulations, and executive orders. For these reasons, the Inadvertent Discovery Plan (IDP) provides useful guidance and instructions for circumstances when cultural resources or human skeletal remains are found. Please carefully read these instructions. If you have any questions, please contact the appropriate WSPRC Area Manager or the WSPRC archaeologist assigned to the undertaking. It is also strongly recommended that anyone conducting ground-disturbing activities watch the training video produced by Washington State Dept of Ecology: Inadvertent Discovery of Cultural Resources or Human Remains: Training for Field Staff. This IDP for cultural resources and human skeletal remains is based on **RCW 27.53**, **RCW 68.50.645,** **RCW 27.44.055**, and **RCW 68.60.055** and **recommended language** from the Department of Archaeology and Historic Preservation (DAHP).

1.4 INADVERDENT DISCOVERY PLAN FOR CULTURAL RESOURCES

A. If cultural resources are found during a project, activity in the immediate area of the find should be discontinued (**stop**), the area secured (**protect**), and the WSPRC archaeologists notified to assess the find (**notify**). ***When in doubt, assume the material is a cultural resource and implement the IDP outlined below.***

B. **Recognizing Cultural Resources-***Types of Historic/Prehistoric Artifacts and/or Activity Areas That May Be Found*

1. Artifacts- Both historic and prehistoric artifacts may be found exposed in backhoe trenches or back dirt piles.

   a) Prehistoric artifacts may range from finished tools such as stone pestles, arrowheads/projectile points, shell beads, or polished bone tools to small pieces or "flakes" or "chips" of exotic stone such as chert, jasper, or obsidian.
   b) Historic artifacts may include older (more than 50 years) nails, plates/ceramics, bottles, cans, coins, glass insulators, or bricks.
   c) Old abandoned industrial materials from farming, logging, railways, lighthouses, and military installations.

2. Activity Area/Cultural Features- While excavating trench lines look for evidence of buried activity areas/cultural features such as old campfire hearths or buried artifacts.

   a) An area of charcoal or very dark stained soil with artifacts or burned rocks may be a fire hearth.
   b) A concentration of shell with or without artifacts may be shell midden deposits.
   c) Modified or stripped trees, often cedar or aspen, or other modified natural features, such as rock drawings or carvings

3. Historic building foundation/structural remains- During excavation, buried historic structures (e.g., privies, building foundations) that are more than 50 years old may be found.
4. Bone- Complete or broken pieces of bones may be discovered exposed in trench walls or in back dirt piles. Bone of recent age is usually transparent or white in color. Older bone is usually found in various shades of brown. Burned bone is usually black or, if heavily burned, bluish-white.

C. STEPS TO TAKE IF A CULTURAL RESOURCE IS FOUND DURING CONSTRUCTION

1. Stop if a cultural resource(s) is observed or suspected, all work within the immediate area of the discovery must stop.
2. Protect the area from further disturbance. Do not touch, move, or further disturb the exposed materials/artifacts. Create a protected area with temporary fencing, flagging, stakes, or other clear markings that is large enough (30 feet or larger) to protect the discovery location area. The WSPRC archaeologist can help determine the size of the protected area. Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site.
3. Notify the WSPRC archaeologist. If the area needs to be secured, notify the Park Ranger or Park staff as well.
4. If requested by the WSPRC archaeologist, take photographs with a scale (e.g., pen, coin, etc.) and collect geospatial information of the discovery site to document the initial finds.

D. WHAT NOT TO DO IF A CULTURAL RESOURCE IS FOUND DURING CONSTRUCTION

1. Do not remove any artifacts from the site of the discovery.
2. Do not dig out objects protruding from any trench walls as this may cause further damage to artifacts and/or destroy important contextual information.
3. Do not share any information about the find, including on social media, except as necessary to implement the IDP.

E. WHAT HAPPENS NEXT?

1. The find will be assessed by a professional archaeologist (may be a WSPRC archaeologist or an archaeology consultant).

    a) If the find is not a cultural resource, construction work may resume.
    b) If the find is a cultural resource, the WSPRC archaeologist will contact the DAHP and affected Tribes, as appropriate, to develop a suitable treatment plan for the resource.

2. Construction work may resume in the protected area after the WSPRC archaeologist assigned to the undertaking has determined that the find has been adequately investigated and, if necessary, a treatment plan and monitor are in place to protect any remaining archaeological deposits.

1.5 INADVERDENT DISCOVERY PLAN FOR HUMAN SKELETAL REMAINS

A. Native American burials and historic grave sites are uncommon features on Washington State Park lands. These remains, as well as any associated artifacts or funerary objects, are protected under state law and, if the park is a federal lease, applicable federal law. If you discover human remains (or bones that you believe may be human remains) during construction, please follow these important instructions. It is imperative that reporting and treatment of any human remains found during construction or any ground-disturbing activities are treated with utmost dignity and respect.

B. Steps to Take If Human Skeletal Remains are Found During Construction

1. **Stop** if human skeletal remains observed or suspected, all work within the immediate area of the discovery must stop.
2. **Protect** the area from further disturbance. Do not touch, move, or further disturb the remains. Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection in place and shield them from being photographed. Create a protected area with temporary fencing, flagging, stakes, or other clear markings that is large enough (30 feet or larger) to protect the discovery location area. The WSPRC archaeologist can help determine the size of the protected area. Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site.
3. **Notify** law enforcement and the appropriate county medical examiner/coroner as soon as possible. If you are unsure if the remains are human, the physical anthropologist at DAHP may be called. Also notify the Park Ranger, the WSPRC archaeologist, and the WSPRC Curator of Collections/NAGRPA Specialist of the discovery of the remains.
4. If requested by the law enforcement, the county coroner/examiner, the DAHP physical anthropologist, or the WSPRC archaeologist, take photographs with a scale (e.g., pen, coin, etc.) and geospatial information of the discovery site to document the initial finds.

C. What Not to Do If Human Skeletal Remains are Found During Construction

1. Do not pick up or remove anything.
2. Do not take any photographs of the remains unless instructed to do so by law enforcement, the county coroner/examiner, the DAHP physical anthropologist, or the WSPRC archaeologist. If pictures are requested, be prepared to photograph them with a scale (e.g., pen, coin, etc.) and collect geospatial information of the remains.
3. Do not call 911 unless you cannot reach law enforcement or the coroner/examiner by other means.
4. Do not share any information about the find, including on social media, except as necessary to implement the IDP.

D. What Happens Next?

1. The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and decide whether those remains are forensic (crime-related) or non-forensic.

    a) If forensic, the county medical examiner/coroner will retain jurisdiction over the remains.
    b) If non-forensic, the county medical examiner/coroner will report that finding to the DAHP who will then take jurisdiction over the remains. The DAHP will notify any appropriate cemeteries and all affected Tribes of the remains. The State Physical Anthropologist will decide whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and the affected Tribes. The

DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

Note: The WSPRC archaeologist assigned to the undertaking will be coordinating and consulting with the DAHP, affected Tribes, and other groups as necessary. Additionally, WSPRC's Curator of Collections/NAGPRA Specialist should be included on all written and/or verbal correspondence until the remains have been officially transferred from WSPRC's possession to an outside authority. Until the remains are transferred off of WSPRC's property, it is the responsibility of the Curator of Collections/NAGPRA Specialist to document and track the information regarding all human remains and associated funerary objects (including all material from excavation areas/units from which the human remains were removed).

2. Construction work may resume in the protected area after the WSPRC archaeologist assigned to the undertaking has determined that the find has been adequately investigated and, if necessary, a treatment plan and monitor are in place.

END OF SECTION

SECTION 014000 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Project Representative, Owner, or Authorities Having Jurisdiction are not limited by provisions of this Section.

C. Related Requirements:

1. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Project Representative.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to Authorities Having Jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Project Representative for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Project Representative for a decision before proceeding.

1.4 QUANTITY SHEETS/WEIGHT TICKETS

A. For bulk items, supply quantity sheets (load receipts) to account for each load delivered to the jobsite. Deliver quantity sheets to Inspector on job at delivery time. If Inspector is not on job, deliver quantity sheets on a daily basis to place designated by Project Representative.

B. No payment shall be made for materials delivered for which quantity tickets have not been turned into Inspector or delivered to designated place at end of working day. Backdated tickets are not acceptable as a basis for payment, except at Project Representative's discretion.

C. If bid item for material to be delivered to jobsite is stated in TONS, only weight slips from approved scale are acceptable for payment purposes, unless approved in advance by Project Representative.

D. No payment for materials will be made until proper accounting has been made. Final quantity records are approved by Project Representative, with payment at Project Representative's discretion.

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by Authorities Having Jurisdiction, submit copy of written statement of responsibility sent to Authorities Having Jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Engineer.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Engineer.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.

3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of Authorities Having Jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by Authorities Having Jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

    a. Provide test specimens representative of proposed products and construction.
    b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    d. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Project Representative, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Project Representative.
2. Notify Project Representative seven (7) days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Project Representative's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven (7) days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.

2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least twenty-four (24) hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Project Representative and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Project Representative and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Project Representative and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Project Representative with copy to Contractor and to Authorities Having Jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Project Representative.

4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Project Representative's and Pacific County reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014100 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 PERMITS, CODES AND REGULATIONS

A. The following permits have been applied for (or are on file) and incorporated into the contract:

1. S.E.P.A.
2. Shoreline
3. Conditional Use
4. Pacific County Building
5. Pacific County Grading and Drainage

B. Permit Restrictions:

1. Timing Restrictions (Note: typically apply to in water work).
2. Notification Requirements (Note: often regulatory agencies have notification requirements prior to work commencing)
3. Special Conditions (Note: Consult with the project environmentalist to determine applicable permit conditions.)

C. Conform with the requirements of listed permits and additional or other applicable permits, codes, and regulations as may govern Work.

D. Obtain and pay fees for licenses, permits, inspections, and approvals required by laws, ordinances, and rules of appropriate governing or approving agencies necessary for proper completion of Work (other than those listed under item 1.1A. above and Special Inspections called for by the International Building Code).

E. Conform with current applicable codes, regulations, and standards, which is the minimum standard of quality for material and workmanship. Provide labor, materials, and equipment necessary for compliance with code requirements or interpretations, although not specifically detailed in the Drawings or specifications. Be familiar with applicable codes and standards prior to bidding.

F. Process through Project Representative, requests to extend, modify, revise, or renew any of the permits (listed in 1.1A above). Furnish requests in writing and include a narrative description and adequate Drawings to clearly describe and depict proposed action. Do not contact regulatory agency with requests for permit extensions, modifications, revisions, or renewals without the prior written consent of Project Representative.

1.2 VARIATIONS WITH CODES, REGULATIONS AND STANDARDS

A. Nothing in the drawings and specifications permits Work not conforming to codes, permits or regulations. Promptly submit written notice to Project Representative of observed variations or discrepancies between the Contract documents and governing codes and regulations.

B. Appropriate modifications to the Contract documents will be made by Change Order to incorporate changes to Work resulting from code and/or regulatory requirements. Contractor assumes responsibility for Work contrary to such requirements if Work proceeds without notice.

C. Contractor is not relieved from complying with requirements of Contract documents which may exceed, but not conflict with requirements of governing codes.

1.3 COORDINATION WITH REGULATORY AGENCIES

A. Coordinate Work with appropriate governing or regulating authorities and agencies.

B. Provide advance notification to proper officials of Project schedule and schedule revisions throughout Project duration, in order to allow proper scheduling of inspection visits at proper stages of Work completion.

C. Regulation coordination is in addition to inspections conducted by Project Representative. Notify Project Representative of scheduled inspections involving outside regulating officials, to allow Project Representative to be present for inspections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 014200 – REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the General Conditions of the Contract.

B. "Approved": When used to convey Project Representative's action on Contractor's submittals, applications, and requests, "approved" is limited to Project Representative's duties and responsibilities as stated in the General Conditions of the Contract.

C. "Directed": A command or instruction by Project Representative. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. “Project Engineer,” “Project Architect,” “Engineer,” and “Architect” are interchangeable terms.

J. Project Representative and Owners Representative are interchangeable terms.

K. “As-built Drawings”: Drawings done by the Contractor in the field showing changes to the Work.

L. “Record Drawings”: Drawings prepared based on the information on the As-built Drawings.

1.2 GENERAL

A. Applicable standards of the construction industry have the same force and effect (and are made a part of the Contract Documents by reference) as if directly copied or bound herein.

1.3 PUBLICATION DATES

A. Where compliance with an industry standard is required, comply with the standard in effect on Bid Date.

1.4 ABBREVIATIONS AND NAMES

A. The following acronyms or abbreviations, referenced in the Contract documents, are defined to mean the associated name. Applicable standards include, but are not limited to the following:

1.	AASHTO	American Association of State Highway & Transportation Officials
2.	ACI	American Concrete Institute
3.	AGA	American Gas Association
4.	AI	Asphalt Institute
5.	AIA	American Institute of Architects (The)
6.	AISC	American Institute of Steel Construction, Inc.
7.	AISI	American Iron and Steel Institute
8.	AITC	American Institute of Timber Construction
9.	ANSI	American National Standards Institute
10.	APA	Engineered Wood Association (The)
11.	APWA	American Public Works Association
12.	ASME	American Society of Mechanical Engineers
13.	ASTM	American Society for Testing and Materials International
14.	AWPA	American Wood Protection Association
15.	AWS	American Welding Society
16.	AWWA	American Water Works Association
17.	CRSI	Concrete Reinforcing Steel Institute
18.	EPA	Environmental Protection Agency
19.	HPVA	Hardwood Plywood and Veneer Association
20.	IBC	International Building Code
21.	IEEE	Institute of Electrical & Electronics Engineers, Inc. (The)
22.	IES	Illuminating Engineering Society of North America
23.	LPI	Lighting Protection Institute
24.	MCAA	Mechanical Contractors Association of America, Inc.
25.	NIST	National Institute of Standards and Technology
26.	NCMA	National Concrete Masonry Association
27.	NEC	National Electrical Code
28.	NECA	National Electrical Contractors Association, Inc.
29.	NFPA	National Fire Protection Association
30.	NHLA	National Hardwood Lumber Association
31.	NSF	National Sanitation Foundation International
32.	OSHA	Occupational Safety & Health Administration
33.	PCA	Portland Cement Association, (The)
34.	SEPA	State Environmental Policy Act
35.	UL	Underwriters Laboratories, Inc.
36.	UPC	Uniform Plumbing Code
37.	WCLIB	West Coast Lumber Inspection Bureau (Grading Rules)
38.	WRI	Wire Reinforcement Institute
39.	WSDOE or ECY	Washington State Department of Ecology
40.	WSDOH or DOH	Washington State Department of Health

41. WSDOT Washington State Department of Transportation
42. WSPRC Washington State Parks and Recreation Commission
43. WWPA Western Wood Products Association (Grading Rules)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 PROTECTION OF PROPERTY AND EXISTING FACILITIES

A. Provide protections necessary to prevent damage to park property and facilities.

B. Only rubber-tired equipment are permitted to operate on paved park roads.

C. Protect existing trees and other vegetation indicated to remain in place against cutting, breaking, or skinning of roots, skinning and bruising of bark, or smothering of trees by stockpiling materials within dripline. Provide necessary temporary guards to protect trees and vegetation to remain in place.

D. Make every effort to minimize damage and cutting major tree roots during excavation operations. Provide protection for larger tree roots exposed or cut during excavation operations.

1.2 ENVIRONMENTAL PROTECTIONS

A. Scope:

1. Provide labor, materials, equipment and perform Work required for protection of environment during and as a result of construction operations under contract.

B. Applicable Regulations:

1. Comply with applicable federal, state, and local laws and regulations concerning environmental pollution control and abatement, and specific requirements elsewhere in specifications and drawings to prevent and provide for control of environmental pollution.

C. Protection of Land Resources:

1. Give special attention to the effect of Contractor’s operations upon surroundings. Take special care to maintain natural surroundings undamaged and conduct Work in compliance with following requirements:

    a. When Work is completed, remove storage and other Contractor buildings and facilities, and sites restored to a neat and presentable condition appropriate to surrounding landscape, unless otherwise specified. Remove debris resulting from Contractor's operation.
    b. Store petroleum products, industrial chemicals and similar toxic or volatile materials in durable containers approved by the Authority Having Jurisdiction and located in areas where accidental spillage will not enter water. Store substantial quantities of materials in an area surrounded by containment dikes of sufficient capacity to contain an aggregate capacity of tanks.

D. Protection and Restoration of Property:

1. Preserve public and private property, monuments, power and telephone lines, other utilities, prevention of damage to natural environment, etc., insofar as they may be endangered by Work.
2. When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in execution of Work, or in consequence of non-execution of Contractor, restore, or have restored at Contractor's expense, such property to a condition similar and equal to that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring same, or make good damage or injury in some other manner acceptable to Project Representative.

E. Protection of Water Resources:

1. Perform Work not to create conditions injurious to fish or to their habitat, or which would make water unsuitable for private, municipal, or industrial use.
2. Take special measures to prevent chemicals, fuels, oils, grease, bituminous materials, waste washings, herbicides, insecticides, lime, wet concrete, cement, silt or organic or other deleterious material from entering waterways.
3. Dispose of offsite, in a lawful manner conforming to applicable local, state, and federal laws wastes, effluents, trash, garbage, oil, grease, chemicals, cement, bitumen, etc., petroleum, and chemical products or wastes containing such products. Furnish Owner with documentation showing compliance with this requirement.
4. Conform to applicable local, state, and federal laws for disposal of effluents. Dispose of waters used to wash down equipment in a manner to prevent their entry into a waterway. If waste material is dumped in unauthorized areas, remove material and restore area to condition of adjacent, undisturbed area. If necessary, excavate contaminated ground and disposed of as directed by Project Representative and replace with suitable compacted fill material with surface restored to original condition.

F. Dust Control:

1. Dust control is required on roads used by Contractor. Maintain excavations, embankments, stockpiles, roads, plant sites, waste areas, borrow areas and other Work areas within or without the Project boundaries free from dust which would cause a hazard or nuisance to others. Provide approved, temporary methods of stabilization consisting of sprinkling, chemical treatment, light bituminous treatment, or equal methods to control dust. If sprinkling is used, sprinkling must be repeated at intervals to keep disturbed areas at least damp.

G. Temporary Water Pollution/Erosion Controls:

1. Provide for prevention, control and abatement of soil erosion and water pollution within the limits of Project, to prevent and/or minimize damage to adjacent bodies of water and Work itself.

2. Coordinate temporary soil erosion/water pollution control measures with permanent drainage and erosion control Work to ensure effective and continuous controls are maintained throughout Project life.

3. Develop a written spill prevention and response plan for construction activities adjacent to/and over any surface waters and/or wetlands. "Adjacent" means within 150' as measured on a horizontal plane. Plan addresses:

    a. Narrative description of the proposed construction methods, materials, and equipment to be used for Work.
    b. Assessment and listing of hazardous materials and/or potential contaminants that could be released during execution of Work.
    c. SDS sheets with cleanup instructions for potential contaminants.
    d. Spill response/cleanup materials and instructions for use.
    e. Procedures and precautions to prevent spills.
    f. Spill response training for on-site personnel, including the location of the containment and cleanup materials at site.
    g. Emergency notification in case of a spill or release. Park Manager and Project Representative must be included on the list of notified.

4. Comply with applicable codes and ordinances for spill prevention and response plan and submit a copy to Project Representative before commencing Work adjacent to or over any waters and/or wetlands.

H. Emergency Spill Response Notification

1. Under state law, Ecology must be notified when any amount of regulated waste or hazardous material that poses an imminent threat to life, health, or the environment is released to the air, land, or water, or whenever oil is spilled on land or to waters of the state. The spiller is always responsible for reporting a spill. Failure to report a spill in a timely manner may result in enforcement actions. If you are not responsible for a spill, making the initial notification does not make you liable. However, please consult with Ecology's response team before attempting any type of response or cleanup. Also notify Park Manager and Project Representative.

2. If oil or hazardous materials are spilled to state waters, the spiller must notify both federal and state spill response agencies. The federal agency is the National Response Center at 1-800-424-8802. For state notification, call the Washington Emergency Management Division (EMD) at 1-800-258-5990 or 1-800-OILS-911 AND the appropriate Ecology regional office for your county (see numbers below). An Ecology spill responder will normally call reporting party back to gather more information. The agency will then determine its response actions. Also notify Park Manager and Project Representative.

3. Ecology Regional Spill Reporting Numbers:

    h. Southwest Regional Office: (360) 407-6300 (Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, and Wahkiakum counties)

        TDD: Washington Relay Service 711 or (800) 833-6388.

1.3 PARK TRAFFIC/PEDESTRIAN CONTROLS

A. Properly warn the public of construction equipment and activities, open trenches, and/or other unsafe conditions by providing all necessary warning equipment. Equipment includes warning signs, barricades, fencing, flashing lights and traffic control personnel (flaggers).

B. Conduct operations with the least possible obstruction and inconvenience to the public in accordance with appropriate Section(s) of the WSDOT "Standard Specifications".

1.4 PROTECTION OF WORK

A. Protect Work, materials, and equipment against damage, weather conditions, or other hazards. Equipment, Work, or materials found damaged or in other than new condition will be rejected by Project Representative.

1.5 REMOVAL AND REPLACEMENT OF STATE-OWNED ITEMS

A. Should any state-owned items, such as signs, bumper blocks, or related items, interfere with the proper construction process, remove, and reinstall such items to the satisfaction of Project Representative.

1.6 USE OF PARK SPACE

A. Only in areas of park that Contract covers and only during active inclusive dates of Contract.

B. Contractor vehicle and equipment parking only as designated by Project Representative.

C. Contractor will be issued temporary parking passes for construction crew, vehicles, and equipment, valid for the duration of the contract only.

1.7 ROADWAY CLOSURE

A. Closure of the park is not in the best interest of the general public, only close roads being trenched while conduits, etc., are being installed, and immediately reopened for traffic. Supply necessary barricades, etc., to effectively prevent automotive traffic from entering upon any traveled way while trenches are open, unless other approved appropriate safety measures are taken.

1.8 UTILITIES

A. Existing subsurface utilities on Project are represented on Contract Drawings to the best of the Commission's knowledge. It is Contractor's responsibility to verify existence of utilities and determine exact location and depth. Maintain use of utilities during construction through temporary connections or other measures suitable to Commission. No extra compensation will be made for removal, temporary connections, relocations, or replacement of utilities.

1.9 SERVICE OUTAGES

A. Coordinate and schedule outages for, power, water, and sewer service connections/repairs with Park Manager, so as not to inconvenience park staff or public.

1.10 SANITARY FACILITIES

A. Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of Authorities Having Jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 015526 – TRAFFIC CONTROL

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

A. Section 015000 – Temporary Facilities and Controls

1.2 GENERAL

A. Provide flaggers, signs, and other traffic control devices in accordance with the Washington State Department of Transportation (WSDOT) Current Edition, Standard Specifications for Road, Bridge, and Municipal Construction and the Manual on Uniform Traffic Control Devices (MUTCD). Erect and maintain construction signs, warning signs, detour signs, and other traffic control devices necessary to warn and protect the public from injury or damage as a result of the Contractor's operations that may occur on highways, roads, drives, streets, or sidewalks and walkways. Do no work on or adjacent to the above locations until necessary signs and traffic control devices are in place.

B. These flaggers, signs, and other traffic control devices are for the safety of the public, the Contractor's employees, and Owner's personnel and to facilitate the movement of the traveling public. They may be used for the separation or merging of public and construction traffic when in accordance with a specific approved traffic control plan.

C. Upon failure of the Contractor to immediately provide flaggers; erect, maintain, and remove signs; or provide, erect, maintain, and remove other traffic control devices, the Commission may, without further notice to the Contractor, shut down the Contractor's activity until adjacent traffic control is implemented.

D. Providing adequate flaggers, signs, and other traffic control devices for the protection of the work and the public at all times, regardless of whether or not the flaggers, signs, and other traffic control devices are ordered by the Project Representative, furnished by the Commission, or paid for by the Commission or by any modifications made by the Contractor. The Contractor shall be liable for injuries and damages to persons and property suffered by reason of the Contractor's operations or any negligence in connection therewith.

E. Lane closure or diversion: advise Project Representative a minimum of two calendar days prior to implementation.

1.3 CONFORMANCE TO ESTABLISHED STANDARDS

A. Flagging, signs, and other traffic control devices: conform to the standards established in the latest edition of the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, to the WSDOT Traffic Control Plans 1 through 18 (TC1-19) as published by WSDOT at https://www.wsdot.wa.gov/Design/Standards/PlanSheet/Work-Zone-Typical-TCPs.htm and to the Manual on Uniform Traffic Control Devices (MUTCD).

1.4 SUBMITTALS

A. Submit a temporary traffic control plan for Project Representative review.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, and access by emergency vehicles. Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas. Prevent parking on or adjacent to access roads or in non-designated areas.

END OF SECTION

SECTION 015639 – TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the administrative and procedural requirements for the protection of trees, shrubs, and plant material not designated for removal. Leave such trees, shrubs, and plant materials in place and protected from damage or injury during construction using full and adequate methods of protection and trimming of existing trees and other vegetation that interfere with, or are affected by, execution of the work, whether temporary or permanent construction, in order to preserve the aesthetic character of the park.

1.2 REFERENCES

A. Definitions

1. Arborist Qualifications: An arborist approved of by the Project Representative or certified by the International Society of Arboriculture (ISA) or Association of Consulting Arborists (ASCA) and licensed in the jurisdiction where project is located.
2. Critical Root Zone (CRZ): The portion of the root system nearest the stem that is critical for the stability and vitality of the tree. The minimum CRZ is a circular area having a radius of one foot for each one inch of trunk diameter defined by measuring the trunk diameter at 4.5 feet above ground level. For example, a tree that has a diameter of 20 inches would have a CRZ with a radius of 20 feet from the base of the tree. This is a MINIMUM CRZ radius for healthy trees; the CRZ is usually beyond the dripline of the tree. A ratio 2.5 feet radius for each 1-inch diameter is desirable for old growth, historic, and character trees as designated by the Project Representative.
3. Vegetation Protection Zone (VPZ): A defined area of any size within the project area where existing vegetation (trees, shrubs, or other plant material) is to be protected from construction impacts. The zone may be accomplished by physical barriers or other means (e.g., soil protection layers or treatments).
4. High Risk Tree: Any tree with a structural defect and/or disease that makes the tree highly prone to failure, and which has a target and may result in personal injury or property damage. A high risk tree is the same as an “Emergency Tree” as defined in WAC 352-28-010 (http://apps.leg.wa.gov/wac/default.aspx?cite=352-28-010).

B. Reference Standards

1. ANSI A300. Specifications for Tree, Shrub, and Other Woody Plant Management.
2. ANSI Z133-2012. Safety Requirements for Arboricultural Operations.
3. Council of Tree and Landscape Appraisers. (2020). *Guide for Plant Appraisal*, 10th ed. International Society of Arboriculture, Champaign, Illinois.

1.3 SUBMITTALS

A. Tree Removal and Pruning Schedule: Written schedule from arborist detailing scope and extent of tree removals and pruning of trees to remain that interfere with or are affected by construction.

B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

1.4 QUALITY ASSURANCE

A. Tree Pruning Standard: Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."

B. Construction Management Standard: Comply with ANSI A300 (Part 5): Management of Trees and Shrubs During Site Planning, Site Development, and Construction

C. Tree Planting: Comply with ANSI A300 (Part 6) Planting and Transplanting

D. Tree Root Protection and Management: Comply with ANSI A300 (Part 8) – 2013 Root Management Standard

PART 2 - PRODUCTS

2.1 PLASTIC MESH FENCING WITH STEEL POSTS

A. Continuous molded safety mesh 36 inches wide with clear openings no more than 1-1/2 inches x 2 inches. Orange, 40 grams per square foot, high density polyethylene with U-V inhibitor suitable for above-grade use.

B. Posts five-foot steel heavy-duty “T” posts, 1-3/8 inches x 1-3/8 inches x 7/64 inches with steel anchor.

C. Nylon zip straps having a minimum breaking strength of 150 lbs.

2.2 SOIL AND ROOT PROTECTION

A. Mulch: Ground, shredded bark, or wood and bark chips, free from deleterious materials. Or new straw mulch, free from weeds, weed seeds, and foreign materials.

B. Landscape fabric: American Excelsior Stabilenka 140, Celanese Mirafi 140, Propex 45-45, or approved equivalent geotextile.

C. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.

D. Ground staples: 9 inches x 9 inches wire staples sufficient for holding landscape fabric or filter fabric in place for required time period.

E. Ground protection mats: Construction mats or timber mats, as a temporary road surface of sufficient weight rating for the equipment being operated in the work area.

2.3 TREE TRUNK PROTECTION

A. Common wood 2 inches x 4 inches lumber, 8 feet long, without nails, other hardware, concrete residue, or other material that may be detrimental to plant health.

B. Strapping sufficient to hold 2 x 4's in place.

PART 3 - EXECUTION

3.1 PLANNING AND NOTIFICATION

A. Where existing trees and other vegetation are in the area of work, or where existing trees outside the area of work have a CRZ extending into the area of work, employ methods to minimize adverse impact to the existing trees (including limbs, stems, and roots), understory vegetation and their root systems, and soils. Where VPZ are designated by the Project Representative and/or in project plans, observe protection measures set forth herein. Notify the Project Representative of any construction work within the CRZ of trees at least two (2) working days before the scheduled activity.

3.2 PREPARATION

A. Prior to Construction: Erect tree and plant protection prior to beginning any site work. Protect trees to remain against cutting, breaking, skinning, or compaction of roots; skinning or bruising of bark; breaking of branches and foliage. Review locations, fencing, and other markings of any VPZ and CRZ for trees within the construction area with the Project Representative.

B. Tree Removal: Trees that are scheduled for removal as part of the project should be removed before construction to prevent hazards during construction.

C. Material Storage: Do not store construction materials, debris, or excavated material inside critical root zones or vegetation protection zones.

D. Vehicle and Foot Traffic: Designate access routes within construction area and limitations on equipment and vehicles. Designate parking on existing pavement or away from critical root zones of trees. Limit vehicle and foot traffic within CRZ to minimize soil compaction over root systems.

3.3 CRITICAL ROOT ZONE AND VEGETATION PROTECTION ZONE DESIGNATION

A. Temporary Fencing: Install temporary fencing around CRZ and VPZ as indicated by Project Representative. Maintain temporary fence and remove when construction is complete.

1. Line posts space at eight feet maximum. Set posts vertically to minimum 18 inches depth. Posts may be driven provided method of driving does not damage posts. Ensure that posts do not damage tree roots.
2. Secure plastic fencing to posts with nylon zip-straps, minimum three per post. Draw fence material tight and vertical.
3. With Project Representative's approval, sections of tree protection fencing may be removed temporarily to allow approved short-term construction activities. Stockpile removed fencing carefully for reinstallation. Reinstall fencing immediately when construction operations permit.

B. Tree Trunk Protection: Where required tree trunks shall be protected by placing 2 x 4 lumber around the trunk, spaced so that strapping will not come in contact with the tree bark and lumber does not damage branches. Use strapping to hold lumber in place. Secure straps without nailing into or otherwise damaging tree bark.

3.4 SOIL COMPACTION, LOSS, AND DAMAGE WITHIN THE CRITICAL ROOT ZONE

A. Protection against soil compaction within the CRZ may include but will not be limited to the following methods:

1. Application of a 6-inch thick layer of mulch (or wood chips salvaged from clearing and grubbing operations) within the CRZ. Replenish mulch as necessary to maintain a 6-inch depth. Do not place mulch within 6 inches of tree trunks. Where mulch is to be removed following project completion it should be underlaid with a porous geotextile.
2. Ground protection mats, such as: timber or steel planking, construction mats, 1/2 inches thick CDX grade plywood, or brush for protection of surface roots and vegetation from equipment.
3. Where equipment operating within the CRZ exceeds 12,000 lbs use a 6-inch layer of mulch overlayed with ground protection mats described above.

B. Protection of soils against erosion and loss within the critical root zone of trees may require application of mulch, wood chips, or landscape fabric at the request of the Project Representative.

C. Noxious Materials: Protect soils from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials; washout of concrete mixing vessels and tools or other products that change the acidity of soils; and ponding, eroding, or excessive wetting caused by dewatering operations.

3.5 TRENCHING, DIGGING, TUNNELING, AND GRADING WITHIN THE CRITICAL ROOT ZONE:

A. Disturbance to soils and impacts to roots within the CRZ may require any of, and will not be limited to, the following methods, practices, and restrictions:

1. Maintain existing grade within CRZ of trees unless otherwise directed.
2. Lowering grades (cutting): Where existing grade is above new finish grade shown around trees, carefully excavate within CRZ to new grade. Cleanly cut roots exposed by excavation approximately 3-inches below soil surface of new finish grade.
3. Raising grades (filling): Where existing grade is raised within the CRZ to greater than 4 inches above existing grade these roots shall be considered damaged by smothering. Methods to increase air exchange of tree roots within these areas may be required. Examples of such methods may include and will not be limited to:

    a. Application of a 6 inch or thicker layer of large clean aggregate (2 inches by 4 inches or larger) covered with landscape fabric below fill material to maintain large pore space.
    b. Selection of a fill material with high porosity and minimal compressibility. Limited compaction of material.

4. Alternative excavation methods that minimize root damage may be required. These may include but are not limited to: hand digging, horizontal boring, use of an air excavation tool, or other methods as otherwise deemed necessary by the Project Representative.

B. Only limited intrusions into tree CRZ zones will be allowed as shown on the plans and with the approval of the Project Representative. Where trenching for utilities or irrigation is required within CRZ's of trees the following may be required:

1. No cutting of roots greater than two inches diameter. Tunnel under or around roots by drilling, auger boring, air excavation, or digging by hand.
2. Where necessary for installation, cut roots with sharp pruning instruments flush with the edge of the trench or tunnel; do not break or chop.
3. Avoid hitting roots with heavy equipment. Roots that are ripped by equipment should be excavated and cut cleanly at the closest point to the end of the damage.
4. Pile excavated soil outside of the CRZ of residual trees and return area to original grade upon completion of work.
5. Cover exposed roots with soil as soon as possible or at the end of each day; the soil compacted to the original firmness only; and, watered when conditions are dry.
6. Tree root pruning or other tree root treatments as directed by the Project Representative.
7. Root painting is not permitted.

3.6 STEM AND BRANCH PRUNING:

A. Any unnecessary cutting, breaking, skinning, or bruising of bark; breaking of branches and foliage; damage or clearing of vegetation in the work area will not be permitted. Where permitted, stem and branch pruning must follow ANSI A300 (Part 1).

B. Temporary tie-up of low limbs is permitted where designated by the project representative.

C. All final pruning cuts shall be made in branch tissue close to the trunk or parent limb, without cutting into the branch bark ridge or collar and without leaving a stub. Flush cuts to the tree trunk that remove the branch collar are unacceptable. Flush cuts result in a larger wound and expose trunk tissues to the possibility of decay.

D. All major tree pruning must have prior approval of Project Representative. An approved arborist may be required, at the Contractors expense, for extensive or technically challenging pruning activities. Such requirements will be made explicit to the Contractor prior to the start of work.

E. Only proper branch pruning techniques will be accepted. Improperly pruned trees could be irreparably damaged and are subject to section 3.7 DAMAGE TO TREES AND TREE REPLACEMENT.

3.7 DAMAGE TO TREES AND TREE REPLACEMENT:

A. Should any tree or vegetation designated to remain be damaged in the course of construction immediately notify the Project Representative for inspection and direction for remedy.

B. Remedies for damage will, at the Owner's discretion, require removal and disposal of the damaged tree(s) and be one of the following, at the discretion of the Project Representative.

1. Replace each damaged tree under 6 inches diameter at breast height measurement with one replacement tree of 1-3/4 inches caliper measure. Replace each damaged tree over 6 inches diameter at breast height measurement with one replacement tree of 1-3/4 inches caliper measure for each 6 inches of diameter at breast height measure of the damaged tree. The new trees may or may not be the same species, at the discretion of the Project Representative. Select nursery stock, plant, and maintain as specified in Section 1.4 QUALITY ASSURANCE.

C. Notify Project Representative in any case where construction called for in the contract documents cannot be completed without damage to trees identified to remain. Approval of the Project Representative is required prior to beginning construction described in the contract documents that might damage a tree designated to remain. Any tree designated to remain which is damaged without Project Representative's written approval, even if damage is necessary to complete the work, will subject the Contractor to remedies described in section 3.7 B above.

END OF SECTION

SECTION 015713 – TEMPORARY EROSION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Washington State Department of Ecology (DOE) Stormwater Management Manual for Western Washington (2021).

C. All erosion and sediment control work shall be in accordance with the Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, Current Edition, Section 8-01, and other sections as specified or applicable.

D. WSDOT/APWA Standard Plans for Road, Bridge and Municipal Construction, Current Edition.

1.2 SUMMARY

A. This Section specifies stabilization of soil and stockpiled materials to minimize erosion and sedimentation during and following construction. Work shall include, but not be limited to, the furnishing and delivery of required materials; installation and maintenance of temporary sedimentation control measures; temporary covering of disturbed areas; and stockpile areas in accordance with the Specifications.

B. Related Sections:

1. Section 01 55 26 – Traffic Control
2. Section 31 10 00 – Site Clearing
3. Section 31 20 00 – Site Earthwork
4. Section 31 25 00 – Erosion and Sedimentation Control

1.3 SUBMITTALS

A. At the preconstruction conference or prior to the start of the construction, the schedule for accomplishment of temporary and permanent erosion control work shall be submitted. No work shall begin until the erosion control schedule and methods of operation have been reviewed and found to comply with the requirements of the plans and specifications. The approved TESC Plan and schedule shall be subject to approved modifications during construction.

B. When operations affect traffic, traffic control shall be provided for in accordance with Section 01 55 26 – Traffic Control.

C. List of Contractor's personnel responsible for the construction and maintenance of the temporary erosion control measures along with telephone and mobile phone numbers and email

addresses. Identify which personnel is available on-call on a 24 hour, 7 days per week basis for the maintenance of erosion control measures.

D. Submit a Spill Prevention, Control and Countermeasures (SPCC) Plan as described in the WSDOT Standard Specifications, Section 1.07.15 within seven (7) working days of Notice-to-Proceed.

E. Follow the approved SPCC Plan and sequence of construction. If the Contractor chooses to modify the approved plan, Contractor shall submit a revised plan to the Owner for approval. The Contractor shall assume all responsibility and costs associated with a revised plan.

1.4 QUALITY ASSURANCE

A. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal or State or local agencies, the more restrictive laws, rules, regulations, or requirements shall apply.

B. The Contractor is to use Best Management Practices in the performance of the stabilization of soil and stockpiled materials and to minimize erosion and sedimentation during and following construction.

C. All TESC work is to comply with the Department of Ecology Western Washington Stormwater Management Manual.

PART 2 - PRODUCTS

2.1 EROSION CONTROL DEVICES

A. Materials shall be as specified in WSDOT/APWA Section 9-14.5.

a. SILT FENCE: Silt fence shall be High Visibility Silt Fence with Backup Support per WSDOT Standard Plan I30.17-00. Materials for silt fence shall meet the requirements of Section 9-14 and 9-33 of the WSDOT Standard Specifications.
b. WATER FOR DUST CONTROL: Use Water with a mineral content not exceeding potable water standards.2.2 CONSTRUCTION GEOTEXTILE

A. Materials shall be as specified in WSDOT/APWA Section 9-33.

2.3 QUARRY SPALLS

A. Materials shall be as specified in WSDOT/APWA Section 9-13.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor shall limit the surface area of erodable earth material exposed by clearing, grubbing, excavation, borrow and fill operations based on the ability to control erosion and sediment transport as specified herein. Contractor shall provide immediate, permanent, or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment.

B. The TESC facilities shall be constructed as shown on the plans and as specified herein in conjunction with all clearing, grading, and other land alteration activities, and in such a manner as to ensure that sediment-laden water does not enter the drainage systems, or violate applicable water standards.

C. The TESC facilities shown on the plans are the minimum requirements for the anticipated site conditions. Additional temporary best management practices (BMPs) may be required due to actual phasing of the work. The TESC facilities shall be upgraded as needed during the construction period for unexpected storm events or for other reasons to ensure that sediment laden water does not leave the construction site.

D. The TESC facilities shall be inspected and maintained by the Contractor as specified in WSDOT/APWA Sections 8-01.3(1)B and 8-01.3(15).

E. Perform soil stabilization and sediment trapping as follows:

1. Stabilize exposed and disturbed soils, construction areas, and embankments by the suitable application of structural control measures.
2. From October 1 to April 30, no soils shall remain unstabilized for more than two days.
3. From May 1 to September 30, no soils shall remain unstabilized for more than seven days.

F. Remove temporary erosion and sediment control measures within 30 days after the final site stabilization is achieved or after the temporary control measures are no longer needed. Remove or stabilize trapped sediment on site. Permanently stabilize disturbed soils areas resulting from removal.

G. Handle and dispose of pollutants, other than sediment, that occur on site during construction in a manner that does not cause contamination of stormwater.

H. Maintain and repair temporary and permanent erosion and sediment control structural control measures as needed to ensure continued performance of their intended function. Conduct maintenance and repair in accordance with an approved plan. Maintain soil erosion and sediment control measures in accordance with Section 8-01.3 of the WSDOT Standard Specifications

3.2 AREAS OF WORK

A. The boundaries of the clearing limits will be clearly flagged by the Contractor and reviewed by the Owner prior to construction. Disturbance of the ground will not be permitted beyond the flagged boundary. The flagging shall be maintained for the duration of construction.

B. Temporary erosion and sedimentation control may include construction work outside the clearing limits where such work is necessary as a result of project construction such as stockpile operations and equipment storage sites.

C. Take provisions to minimize transport of sediment (mud) onto the paved roads wherever construction vehicle access routes intersect said roads. If sediment is transported onto a road surface, thoroughly clean and said surface at the end of each day. Remove sediment from roads by shoveling or sweeping and transporting to a controlled sediment disposal area. Street washing shall be allowed only after sediment is removed in this manner.

END OF SECTION

SECTION 01 57 23 – TEMPORARY STORM WATER POLLUTION PREVENTION

PART 1 - GENERAL

1.1 SUMMARY

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

B. Washington State Department of Ecology (DOE) Stormwater Management Manual for Western Washington (2021).

C. Federal Regulations for controlling discharges of pollutants (including chemicals, erodible material, and trash) from municipal separate storm sewer systems, construction sites, and industrial activities, were brought under the National Pollution Discharge Elimination System (NPDES) permit process by amendments to the Clean Water Act (CWA), and promulgation of federal stormwater regulations issued by the United States Environmental Protection Agency (USEPA). The USEPA uses amount of ground disturbance as a measure of a project potential to generate pollution from erosion. NPDES Phase I regulates discharges from construction sites that disturb 5 acres or more. NPDES Phase II regulations expand existing General Permit requirements under Phase I to include/regulated discharges from construction sites that disturb land equal to or greater than one (1) acre and less than 5 acres, known as Small Construction Activity. Construction disturbances 1 acre and above typically require a formal NPDES permit and a formal Stormwater Pollution Prevention Plan (SWPPP) must be submitted to Agency(ies) with Jurisdiction for review and approval.

D. Washington State Department of Ecology (DOE) is the issuing agency for the Construction Stormwater General Permit. Compliance with the Stormwater Management Manual for Western Washington (2019).

E. The work of this section consists of implementing measures to prevent discharges of pollutants, including temporary storm water pollution during construction activities, either through compliance with NPDES permit program, or in conformance with NPS guidance for a SWPPP.

F. Related Sections:

1. Section 01 55 26 – Traffic Control
2. Section 31 10 00 – Site Clearing
3. Section 31 20 00 – Site Earthwork
4. Section 31 25 00 – Erosion and Sedimentation Control

1.2 DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E2114.

B. Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade utility of the environment for aesthetic, cultural, or historical purposes.

C. National Pollution Discharge Elimination System (NPDES) Phase I: Regulates discharges from construction sites that disturb 5 acres or more.

D. NPDES Phase II: Regulations expand existing General Permit requirements under Phase I to include and regulate discharges from construction sites that disturb land equal to or greater than one (1) acre and less than 5 acres, known as Small Construction Activity.

E. Storm Water Pollution Prevention Plan (SWPPP): Developed and implemented stormwater management measures to protect surface water from pollutants during construction activities disturbing an acre or more in compliance with federal, state, and local requirements for permit approval under NPDES program.

1.3 SUBMITTALS

A. At the preconstruction conference or prior to the start of the construction, the schedule for accomplishment of temporary and permanent erosion control work shall be submitted. No work shall begin until the erosion control schedule and methods of operation have been reviewed and found to comply with the requirements of the permit, plans and specifications by the Owner. The approved SWPPP and schedule shall be subject to approved modifications during construction.

B. Inspection Schedule: Submit schedule for inspection and monitoring of storm water pollution prevention measures.

C. When operations affect traffic, traffic control shall be provided to the Owner for approval in accordance with Section 01 55 26 – Traffic Control.

D. List of Contractor's personnel responsible for the construction and maintenance of the temporary erosion control measures along with telephone and mobile phone numbers and email addresses. Identify which personnel is available on-call on a 24 hour, 7 days per week basis for the maintenance of erosion control measures.

E. Erosion Control Products: Submit manufacturer's product information and installation recommendations for wattles, filter fabric, erosion control blanket, and other materials proposed for use on this project.

1.4 QUALITY ASSURANCE

A. Contractor shall prepare and submit a plan to Owner for review and concurrence.

B. Orientation Conference: Contractor shall arrange and conduct an Erosion and Sediment Control meeting/briefing to inform parties, scheduled to be on-site during project, of measures to be implemented for proper erosion and sediment control (may be included as part of Pre-Construction Meeting).

1. Installation of wattles, and other forms of erosion and sediment control shall not begin until after this meeting has occurred.

C. Pollution Prevention and Erosion Control Manager: Contractor shall designate Pollution Prevention and Erosion Control Manager responsible for implementation, inspection, maintenance, and amendments to approved plan.

1. Pollution Prevention and Erosion Control Manager shall be familiar with temporary storm water pollution prevention procedures and Best Management Practices and ensure emergency procedures and plan are updated as needed and available for inspection.
2. When changes in approved plan are required, Pollution Prevention and Erosion Control Manager shall prepare and certify an amendment and submit to Contracting Officer for review and concurrence.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 ENVIRONMENTAL PROTECTION

A. Protection of Natural Resources: Comply with applicable regulations and these specifications. Preserve natural resources within project boundaries and outside limits of work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by Owner.

B. Construction Zone: Arrange construction activities to minimize pollution (i.e., erosion, trash, etc.) to maximum practical extent.

1. Clearing, excavation, and grading shall be limited to those areas of project site necessary for construction. Minimize area exposed and unprotected.
2. Clearly mark and delineate limits of work activities.
3. Equipment shall not be allowed to operate outside limits of work or to disturb existing vegetation.
4. Excavation and grading shall be completed during dry season to maximum extent possible.
5. Material shall be stored away from locations where water is present to greatest extent practicable.

3.2 REGULATORY REQUIREMENTS

A. Permits: Contractor shall obtain required NPDES permits resulting in no impacts to scheduled work. Contractor shall:

1. Implement requirements of NPDES permit for erosion control due to storm water runoff during construction.
2. Implement good housekeeping practices, inspections and record keeping.
3. Prior to construction, Contractor and Subcontractors shall sign certifications (included in the plan) that they understand requirements of NPDES permit.

4. Subcontractors shall comply with requirements of NPDES under supervision of Contractor.
5. Accepted plan shall comply with terms and conditions of EPA permit.

B. Notice of Intent (NOI): Contractor shall file a Notice of Intent and formal SWPPP as required to the Agency(ies) with Jurisdiction.

C. Notice of Termination (NOT): After Substantial Completion of Work, Contractor shall file a Notice of Termination (NOT) with the Agency(ies) with Jurisdiction.

D. Owner Notification: Contractor shall notify Owner in writing and by telephone of these events:

1. Erosion and sediment control meeting/briefing.
2. Following installation of required sediment control structures.
3. Prior to removal of or modification to sediment control structures.
4. Prior to removal of sediment control structures.

3.3 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

A. Review and Acceptance: Contractor and Owner will jointly review Plan and agree to needed revisions. Contractor shall incorporate revisions, sign, and submit final Plan to Owner. Final Plan will be the document enforced on the project.

1. Accepted Plan will describe and ensure implementation of practices to be used to reduce pollutants in storm water discharges.
2. Contractor shall maintain current copy of Plan and associated records and forms at jobsite throughout duration of project.
3. Plan shall be available for public inspection and inspection and use of Owner.
4. Approval of Contractor’s Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.

B. Implementation: Implement Plan as required throughout construction period and maintain erosion control elements in proper working order.

1. Do not perform clearing and grubbing or earthwork until Plan has been implemented.

C. SWPPP (including inspection forms) and data used to complete the NOI shall be provided to Contractor.

3.4 SITE INSPECTIONS AND PLAN REVISIONS

A. Inspections: Contractor and Owner will perform a weekly inspection onsite.

1. Inspection shall include disturbed areas not completely stabilized, areas used for storage of materials, locations where vehicles enter or exit site, and other erosion and sediment controls included in the Plan.
2. Inspections shall be documented.
3. Inspection forms shall be retained onsite in Plan notebook throughout construction period.

B. Plan Revisions: It may be necessary to revise Plan during construction to make necessary improvements, revisions, or to respond to unforeseen conditions noted during construction or site inspections.

1. Plan shall specify mechanism whereby revisions may be proposed by Contractor or Owner.
2. Contractor and Owner will jointly review each revision to Plan before changes incorporated and implemented. Contractor will then provide revised copy of Plan to Owner.
3. Accepted modifications will be implemented within 7 calendar days following date of inspection when deficiencies or necessary corrections are first noted.

C. Negligence: Provide additional temporary erosion and pollution controls made necessary by Contractor's errors or negligence at no additional cost to Government.

3.5 HOUSEKEEPING AND SITE MANAGEMENT

A. Store materials onsite in conformance to Federal, state, local, and manufacturer's regulations and specifications. Use Best Management Practices to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.

B. Manage solid waste in conformance to Federal, state, and local regulations. Best Management Practices should be used to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.

C. Include a spill prevention and control plan with provisions placed in SWPPP.

D. Manage hazardous waste (including contaminated soil) in conformance to Federal, state, and local regulations and guidelines.

3.6 EROSION CONTROL MEASURES

A. Erosion control measures shall consist of Best Management Practices for storm water discharges, including silt fencing, wattles, barrier protectors, temporary soil retention blankets, excelsior drainage filters, sediment traps and berms.

B. Berms and excelsior drainage filters shall be used to form sediment traps and control run-on and run-off into other areas, including creeks, streams, marshes, access roads, well areas, and staging areas.

C. Erosion control measures shall be used to contain only direct precipitation in construction zone. Contained water shall be allowed to percolate into ground or drain slowly through drainage filter sediment traps.

D. Earthen sediment traps or holding ponds shall not be used unless accepted by Owner.

E. Reduce runoff velocity and direct surface runoff around and away from fuel containment, storage, and borrow areas.

F. Divert surface runoff around and away from cut and fill slopes.

G. Excess water used for dust control shall be contained within demolition areas by erosion control measures.

H. Contractor shall prevent deposition of materials onto paved areas. Contractor shall inspect paved areas for deposited materials weekly and remove materials immediately.

I. Furnish, install, maintain, and operate necessary control measures and other equipment necessary to prevent erosion as described in approved SWPPP.

J. Before work begins, sufficient equipment shall be available on site to assure operation and adequacy of erosion control system can be maintained.

3.7 MAINTENANCE OF TEMPORARY FACILITIES

A. Ensure erosion and sediment control structures remain effective throughout excavation and grading operations. Relocate structures as necessary.

B. Inspect control structures after each significant rainfall. Promptly repair breaches which occur.

C. Contractor shall remove entrapped sediment from behind excelsior drainage filter after each storm.

3.8 REPORTING

A. If a discharge occurs or if project receives written notice or order from regulatory agency, Contractor shall immediately notify Owner and shall file written report to Agency(ies) with Jurisdiction within 7 days of discharge event, notice, or order. Corrective measures shall be implemented immediately following discharge, notice, or order. The report to the Agency(ies) with Jurisdiction shall contain:

1. Date, time, location, nature of operation, and type of discharge, including cause or nature of notice or order.
2. Best Management Practices deployed before discharge event, or prior to receiving notice or order.
3. Date of deployment and type of Best Management Practices deployed after discharge event, or after receiving notice or order, including additional Best Management Practices installed or planned to reduce or prevent re-occurrence.
4. An implementation and maintenance schedule for affected Best Management Practices.

3.9 SEDIMENT DISPOSAL

A. Sediment excavated from temporary sediment control structures shall be disposed on site with general fill, or with topsoil. Sediment shall be allowed to dry out as required before reuse.

B. Contractor shall place sediment removed from traps and other structures where it will not enter a watercourse and where it will not immediately reenter the basin.

3.10 REMOVAL OF TEMPORARY STORM WATER POLLUTION CONTROL MEASURES

A. Temporary control measures shall be removed with permission of Owner within 20 working days after final acceptance of project, and/or once grading is complete and slopes have stabilized.

END OF SECTION

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and environmental requirements.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, current as of date of Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product demonstrated and approved through submittal process, or where indicated as a product substitution, to have indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Definitions pertaining to sustainable development: As defined in ASTM E2114.

C. Biobased Materials: As defined in Farm Security and Rural Investment Act, for purposes of Federal procurement of biobased products, "biobased" means a "commercial or industrial product (other than food or feed) composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials." Biobased materials also include fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by The Biomass Research and Development Act of 2000.

1. Biobased content: Amount of biobased carbon in material or product as a percentage of weight (mass) of total organic carbon in material or product.

D. Chain-of-Custody: Process whereby a product or material is maintained under physical possession or control during its entire life cycle.

E. Environmentally preferable products: Products and services with lesser or reduced effect on the environment in comparison to conventional products and services. Refer to Environmental Protection Agency's (EPA) Final Guidance on Environmentally Preferable Purchasing for more information.

F. Stewardship: Responsible use and management of resources in support of sustainability.

G. Sustainability: Maintenance of ecosystem components and functions for future generations.

1. Recycled Content Materials: Products containing pre-consumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent with International Organization for Standardization (ISO) 140001 Standard for the Use of Environmental Marketing Claims.
2. Rapidly Renewable Material: Material made from plants typically harvested within a ten-year cycle.
3. Regional Materials: Materials manufactured and extracted, harvested, or recovered within a radius of 500 miles from Project location.

H. Owner Furnished Items: Products and equipment provided by the owner requiring connection by the contractor.

1.3 SUBMITTALS

A. Associated with Submittals, provide:

1. Submit environmental data in accordance with Table 1 of ASTM E2129 for these products:

a. Masonry
b. Finish Carpentry
c. Plastic Fabrications
d. Building Insulation
e. Roofing
f. Joint Sealers
g. Wood & Plastic Doors
h. Windows
i. Gypsum Board
j. Tile
k. Resilient Flooring
l. Wall Coverings
m. Paints & Coatings
n. Toilet Compartments
o. Furnishings & Accessories
p. Plumbing fixtures and equipment.

2. Material Safety Data Sheets (MSDS): For each product required by OSHA to have a MSDS, submit an MSDS. MSDS shall be prepared within the previous five years. Include information for MSDS Sections 1 to 16 in accordance with ANSI Z400.1 and as follows:

a. Section 1: Chemical Product and Company Identification
b. Section 2: Composition/Information on Ingredients
c. Section 3: Hazards Identification
d. Section 4: First Aid Measures
e. Section 5: Fire Fighting Measures

f. Section 6: Accidental Release Measures
g. Section 7: Handling and Storage
h. Section 8: Exposure Controls/Person Protection
i. Section 9: Physical and Chemical Properties
j. Section 10: Stability and Reactivity Data
k. Section 11: Toxicological Information. Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects.
l. Section 12: Ecological Information. Include data regarding environmental impacts during raw materials acquisition, manufacture, and use. Include data regarding environmental impacts in event of accidental release.
m. Section 13: Disposal Considerations. Include data regarding proper disposal of the chemical. Include information regarding recycling and reuse. Indicate whether or not product is considered to be "hazardous waste" according to United States EPA Hazardous Waste Regulations 40 CFR 261 (Code of Federal Regulations).
n. Section 14: Transportation Information. Identify hazard class for shipping.
o. Section 15: Regulatory Information. Identify federal, state, and local regulations applicable to the material.
p. Section 16: Other Information. Include additional information relative to recycled content, biobased content, and other information regarding environmental and health impacts.

3. Chain of Custody: Submit chain-of-custody documentation for sustainable forestry for these products:

a. Rough Carpentry
b. Finish Carpentry
c. Wood Doors
d. Windows
e. Wood Flooring
f. Furnishings & Accessories

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in undamaged condition; in manufacturer's original sealed container or other packaging system; complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with Contract Documents. Ensure products are undamaged and properly protected.
5. Obtain materials in biodegradable or recyclable/reusable packaging which uses minimum amount of packaging possible.

C. Storage:

1. Allow for inspection and measurement of quantity or counting of units.
2. Store materials in manner to not endanger Project structure.
3. Store products subject to damage by the elements, under cover in weather tight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Store loose granular materials in well-drained area on solid surfaces to prevent mixing with foreign matter.

1.6 PACKAGING

A. Where Contractor has option to provide one of listed products or equal, preference shall be given to products with minimal packaging and easily recyclable packaging as defined in ASTM D5834.

B. Maximize use of source reduction and recycling procedures outlined in ASTM D5834.

C. Provide minimum 45 percent post-consumer recycled content and minimum 100 percent recovered fiber content of industrial paperboard in accordance with EPA's Comprehensive Procurement Guidelines and ASTM D5663.

D. Provide minimum 10 percent post-consumer recycled content and minimum 10 percent recovered fiber content of carrier board in accordance with EPA's Comprehensive Procurement Guidelines and ASTM D5663.

E. Provide minimum 5 percent post-consumer recycled content and minimum 5 percent recovered fiber content of brown papers (e.g., wrapping papers and bags) in accordance with EPA's Comprehensive Procurement Guidelines and ASTM D5663.

1.7 ENVIRONMENTALLY PREFERABLE PRODUCTS

A. Provide environmentally preferable products to greatest extent possible.

1. To greatest extent possible, provide products and materials with a lesser or reduced effect on the environment considering raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and/or disposal of the product.
2. Eliminate use of ozone depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with either Montreal Protocol and Title VI or Clean Air Act Amendments of 1990, or equivalent overall air quality benefits that take into account life cycle impacts.
3. Use products meeting or exceeding EPA's recycled content recommendations for EPA-designated products. Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of total value of the materials in project.

1.8 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for product specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare written document containing appropriate terms and identification, ready for execution. Submit draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with Specifications, prepare written document using appropriate form properly executed.
3. Refer to Divisions 2 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products to comply with Contract Documents, undamaged and, unless otherwise indicated, new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types produced and used successfully in similar situations on other projects.
3. Government reserves right to limit selection to products with warranties not in conflict with requirements of Contract Documents.
4. Where products are accompanied by term "as selected," Owner's Representative will make selection.
5. Where products are accompanied by term "match sample," sample to be matched is Governments.
6. Descriptive, performance, and reference standard requirements in Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name single product and manufacturer, provide named product that complies with requirements or approved equal.
2. Manufacturer/Source: Where Specifications name single manufacturer or source, provide product by named manufacturer or source that complies with requirements or approved equal.
3. Products: Where Specifications include list of names of both products and manufacturers, provide one of the products listed that complies with requirements or approved equal.
4. Manufacturers: Where Specifications include list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements or approved equal.
5. Available Products: Where Specifications include list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide specified product, system, or approved equal.
8. Basis-of-Design Product: Where Specifications name product and include a list of manufacturers, provide specified product or a comparable product by one of the other named manufacturers, or approved equal. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics based on the product named.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select product that complies with requirements and matches Architect's sample. Owner's Representative decision will be final on whether a proposed product matches.

    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

a. Standard Range: Where Specifications include phrase “standard range of colors, patterns, textures” or similar phrase, Owner’s Representative will select color, pattern, density, or texture from manufacturer’s product line that does not include premium items.
b. Full Range: Where Specifications include phrase “full range of colors, patterns, textures” or similar phrase, Owner’s Representative will select color, pattern, density, or texture from manufacturer’s product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions: Owner’s Representative will consider Contractor’s request for comparable product when the following conditions are satisfied. If following conditions are not satisfied, Owner’s Representative will return requests without action, except to record noncompliance with these requirements:

1. Evidence proposed product does not require revisions to Contract Documents, that it is consistent with Contract Documents and will produce indicated results and is compatible with other portions of Work.
2. Detailed comparison of significant qualities of proposed product with those named in Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION

3.1 PROTECTION AFTER INSTALLATION

A. Provide adequate coverings as necessary to protect installed materials from damage resulting from natural elements, traffic, and subsequent construction. Remove when no longer needed.

END OF SECTION

AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

Project Name: _____ Project Number: _____

Contractor Name: _____ License Number: _____

Contractor Address: _____

Product	Total $ value provided	Total $ value with recycled content Pre-consumer	Total $ value with recycled content Post-consumer	Total $ value with biobased content	Exempted indicate 1,2,3,4	Comments
Hydraulic Mulch (paper based)						
Hydraulic Mulch (wood based)						
Compost						
Parking Stops (Concrete w/ fly ash, slag cement or low cement content)						
Parking Stops (Plastic/Rubber)						
Patio Blocks/Rubber						
Patio Blocks/Plastic						
Playground Surfaces						
Concrete with fly ash						
Concrete with slag cement						
Concrete with low cement content						
Plastic lumber						
Building Insulation						
Rock Wool						
Fiber glass						
Cellulose						
Perlite Comp Board						
Plastic Rigid Foam						
Glass Fiber Reinforced Foam						
Phenolic Rigid Foam						
Ceramic tile						
Resilient flooring						
Floor Tiles/Rubber						
Floor Tiles/Plastic						
Running Tracks						
Carpet (PET)						
Paint						

Product	Total $ value provided	Total $ value with recycled content Pre-consumer	Total $ value with recycled content Post-consumer	Total $ value with biobased content	Exempted indicate 1,2,3,4	Comments
Reprocessed Latex Paint White & Light Colors						
Reprocessed Latex Dark Colors						
Consolidated Latex Paint						
Toilet/Shower partitions (plastic or steel)						
Other						

CERTIFICATION
I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials:

1. The product does not meet appropriate performance standards.
2. The product is not available within a reasonable time frame.
3. The product is not available competitively (from two or more sources).
4. The product is only available at an unreasonable price (compared with a comparable non-recycled content product.)

Signature: _____ Date: _____

END OF
AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

SECTION 017329 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.3 SUBMITTALS

A. Cutting and Patching Proposal: For work not clearly indicated as cutting and patching on the drawings or specifications, submit a proposal describing procedures at least seven (7) days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information, as applicable:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
5. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
6. Roofing Elements: Where cutting and patching involve cutting and patching roofing. Submit product data and samples of roofing material to be used.
7. Noise and Dust Protection Plan.

B. Architect or Engineer's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity, load-deflection ratio, or seismic bracing capacity.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection:

1. Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
2. Take precautions required by regulations and Standard Specifications to protect personnel and property.
3. Take all necessary precautions for temporary fire protection during welding and cutting.

a. Carefully mask or shield adjacent surfaces to prevent damage from heat or welding materials. Take particular care to prevent fires.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering, and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting. If a valve is used, provide access to the valve.
5. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Roofing / Exterior Building Enclosure: Patch components using material to match existing and in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into Work.

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of twenty-five (25) percent by weight of total non-hazardous solid waste generated by Work. Facilitate recycling and salvage of materials, including the following:

1. Pacific County Solid Waste Recycling, (360) 642-4389 or (360) 642-2541.

1.4 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan within thirty (30) days of date established for the Notice of Award.

1.5 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons.
5. Quantity of waste recycled, both estimated and actual in tons.
6. Total quantity of waste recovered (salvaged plus recycled) in tons.
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by Work.

C. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

D. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within five (5) days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Division 01 Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in Work:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Owner's Use:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site as designated by Owner.
5. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

1. Pacific County Solid Waste Recycling, (360) 642-4389 or (360) 642-2541.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch size.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum 4-inch size.
2. Clean and stack undamaged, whole masonry units on wood pallets.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

E. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

G. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.

I. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.

J. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

K. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

L. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to Authorities Having Jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Waste and debris removed from the worksite and not specified for reuse becomes the responsibility of the Contractor and disposed of off park property in areas authorized by the applicable county and/or state agencies and in accordance with current rules and regulations governing the disposal of solid waste. Disposal fees and sundry charges are paid by the Contractor and are incidental to the contract.

C. Burning: Do not burn waste materials.

D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION

SECTION 017700 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 OPERATING AND MAINTENANCE (O&M) INSTRUCTION MANUAL

A. Final payment will be held to no more than 95 percent completion percentage until receipt of the O & M Instruction Manuals. Payment for Contract closeout item will be made after receipt and approval of the manuals by the Project Representative. Have O & M Instruction Manuals prepared before final payment. Lack of O & M Instruction Manuals will not be a cause for Contract extensions.

B. Furnish three (3) complete hard copy sets of binders and one (1) Electronic PDF copy on a storage device containing the following data for each mechanical, pumping, electrical equipment, major hardware, and plumbing installation or provided on this Project:

1. Installation instructions
2. Operating instructions (start-up and shut-down)
3. Maintenance instructions, including trouble shooting guide
4. Electrical schematics
5. Illustrated parts breakdown and code (if available)
6. Parts list (complete)
7. Technical manuals
8. Provide a complete list of manufacturer's representatives sales offices, or suppliers of major parts used on this Project, including their business address and telephone number, for the Park Manager's use when maintaining/repairing the system. Major parts are defined as other than miscellaneous plumbing, wire, piping fittings, etc.
9. List of subcontractors contact information, and specific items of work performed by them.
10. Tab binders and clearly mark all information contained.

C. Affix to walls, panels, boxes or at other locations, the following data sealed in heavy plastic:

1. Operating instructions (start-up and shut-down)
2. Electrical schematics

D. Operating instructions refer to designated parts of each particular installation as necessary and tag such parts with permanent markers as directed by Project Representative. This includes operational equipment.

1.2 AS-BUILTS

A. Before final acceptance of Project, furnish Project Representative "As-Builts" which shows as-built locations and dimensions of major items constructed. Include locations and elevations of existing utilities encountered during excavation. Show location of pipes, manholes, buildings, structures, etc. by field measurements consisting of at least two (2) ties to permanent surface objects such as hydrants, buildings, etc.

B. Final payment: No more than 95 percent until As-Built Drawings received. Payment made after receipt and acceptance of drawings by Project Representative. Lack of As-Built Drawings will not be a cause for contract extensions.

1.3 SPECIAL TOOLS

A. Deliver special tools required for maintenance and adjustment of equipment to Project Representative upon completion and before final acceptance of Project.

1.4 SPARE MATERIALS AND PARTS

A. Before final acceptance, deliver spare materials, parts and other similar items to storage locations specified by Project Representative.

1.5 CERTIFICATES AND PERMITS

A. Submit signed original certificates of compliance and final approval from Authorities Having Jurisdiction.

1.6 OUTSTANDING DOCUMENTS

A. Expedite and submit outstanding administrative documents including outstanding cost proposals, Change Orders, etc.

1.7 PHOTOGRAPHIC DOCUMENTATION

A. Before final acceptance of this Project, provide one (1) copies of the photo key plan, prints of the photos, and DVD or thumb drive of photos.

1.8 PRIOR OCCUPANCY

A. Reference General Conditions.

B. Commission has the right to occupy completed portions of Project prior to final acceptance, and such occupation is not an acceptance of Project. Prior to occupancy, Project Representative and Contractor mutually agree to a date for prior occupancy; the area to be occupied; that occupancy is commencing within the requirements of applicable codes and ordinances; that endorsements from insurance companies, as necessary to maintain full insurance of Project regardless of prior occupancy, have been obtained; and that other necessary provisions are completed.

C. The Project Representative will inspect areas designated for prior occupancy and issue a letter of acceptance or provide a list of deficiencies to be corrected to Contractor. Correct deficiencies prior to date of occupancy.

1.9 SUBSTANTIAL COMPLETION

A. Reference General Conditions.

B. Notify Project Representative in writing a minimum of seven (7) days in advance of the scheduled date of completion. Project Representative will conduct a "pre-final" inspection and formulate a final punchlist of Work items to be completed prior to final inspection. Project Representative will establish the date of substantial completion based on pre-final inspection findings. Following this inspection, Project Representative will either issue notice of substantial completion or advise the Contractor of deficient items which must be corrected prior to issuance of substantial completion.

1.10 DAMAGE TO FACILITIES, ROADS, VEGETATION OR PROPERTY

A. During the course of construction, should any park facility be damaged by the Contractor's actions, operations, or neglect, repair any such damages to their original condition, as acceptable to the Project Representative, at no cost to the Commission.

B. Repair, restore or replace any park roads, vegetation or property damaged by the Contractor to the original condition at the time construction began. Repair or replace trees and vegetation indicated to remain, which has been damaged by construction operations, in a manner acceptable to the Project Representative.

1.11 FINAL CLEAN-UP

A. Upon completion of the Work and prior to final inspection and acceptance, clean up the entire construction site and all grounds occupied by the Contractor in connection with the Work.

B. Fine graded, rake clean and smooth all worksites and disturbed areas. Remove from the park rubbish, surplus and discarded materials, falsework, temporary structures, equipment, and debris.

C. Leave all phases of the Project clean and ready for public use prior to final acceptance.

D. Inspect all materials and surfaces for damage, scratches, marring, untreated ends of sawcuts, etc. and repair to original or intended condition.

1.12 FINAL INSPECTION AND ACCEPTANCE

A. Reference General Conditions.

B. Notify Project Representative in writing when Work, including punchlist items, has been completed.

C. Project Representative will schedule and conduct a final inspection to verify that outstanding Work items are complete.

D. Owner will establish the date of final acceptance based on the results of final inspection. Complete/correct any items identified as outstanding during final inspection prior to final acceptance of Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 017900 – DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Washington State Parks personnel, including:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment, including environmental considerations.
3. Demonstration and training video.

B. See Divisions 2 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

A. Instruction Program: Submit two (2) copies of outline of instructional program for demonstration and training, including schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. For each training session, Contractor shall submit for approval a proposed outline of subjects to be covered. Training shall not be conducted until outline is approved.

B. Demonstration and Training Video: Submit two (2) copies of each DVD (digital video disc) for training sessions within seven days of end of each training module.

1. Label each DVD with date of demonstration or training, instructor's name, and provide an index of contents. Index shall list start and end time of each subject covered during training session. Sequence of training subjects shall follow sequence listed in approved training outline or as actually conducted

1.3 QUALITY ASSURANCE

A. Instructor Qualifications: Factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Owner's Representative.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include description of specific skills and knowledge that participant is expected to master. For each module, include instruction for:

1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.
2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
3. Emergencies: Instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
4. Operations: Startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
5. Adjustments: Alignments and checking, noise, vibration, economy, and efficiency adjustments.
6. Troubleshooting: Diagnostic instructions and test and inspection procedures.
7. Maintenance: Inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
8. Repairs: Diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

A. Engage qualified instructors to instruct Owner’s personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner’s Representative at least seven days’ advance notice.
2. Conduct training sessions after equipment or system has been accepted and turned over to Government. Coordinate with commissioning requirements.

3. Coordinate with Integrated pest management requirements. Refer to specifications section and approved IPM plan.
4. Individual sections specify duration of training required. If no duration is listed, provide training of sufficient duration to adequately cover subjects.

3.2 DEMONSTRATION AND TRAINING VIDEO

A. General: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of training module, record each chart containing learning objective and lesson outline.

B. Video Format: Digital Video Disc (DVD).

C. Video Recording: Record sessions with high resolution equipment. Instructor's voice shall be clearly audible and understandable on DVD. Utilize supplemental microphone worn by instructor.

D. Narration: Describe scenes on video by audio narration by microphone while video is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

1. DVDs with poor video or audio quality will be rejected and training recorded again.

END OF SECTION

SECTION 020000 – EXISTING CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes information about the following:

1. Maintenance of existing conditions
2. Survey
3. Subsurface investigations
4. Demolition

1.2 REFERENCE DOCUMENTS

A. All Project Documents including Bidding and Contract Documents including General Conditions, Construction Drawings and Division 01 of the Construction Specifications in their entirety; and Construction Specifications. Addenda and Approved Project Change Orders as applicable apply to this Section.

B. Standard Specifications for Road, Bridge, and Municipal Construction, Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter, Current Edition. (Standard Specifications).

1.3 PROJECT CONDITIONS

A. The Contractor shall conduct a site visit to become acquainted with all existing conditions.

B. Familiarization: The Contractor acknowledges an understanding of the nature of the work and physical conditions at the site, the confirmation and conditions of the ground; the character of equipment needed during execution of the work and all other matters than can in any way affect the work or the cost thereof under this Contract.

1.4 MAINTENANCE OF EXISTING CONDITIONS

A. Utilities

1. Utilities of record are shown on the Existing Conditions and Survey Control Plans. These are shown for convenience only and the Owner assumes no responsibility for improper locations or failure to show utility locations on Drawings. Contact applicable utility companies for locating known utilities before earthwork operations proceed (“Call before you dig” locator service phone # (800) 424-5555). At Contractor’s expense, immediately repair any utilities damaged during construction.
2. The Contractor shall familiarize himself with the existing utilities, both aboveground and subsurface within the project area, exercise every precaution to avoid damage to existing

utilities and is responsible for repairing utilities damaged by his operations whether those utilities are indicated on the drawings or not.

3. No excavation shall begin until all known facilities in the vicinity of the excavation area have been located and marked; markings shall be maintained as required by state law.

B. Preserved vegetation

1. Existing vegetation located within the site, which is to be preserved and protected is identified on project drawings. Limits for these areas are shown on the construction drawings, but are approximate. The Contractor will coordinate all land disturbance activities with Owner's Representative prior to performing any land disturbing activity near these areas.

2. Damage to any vegetation cited to remain will be the responsibility of the Contractor and Contractor shall mitigate the damage at Contractor's expense.

1.5 SURVEY

A. The base survey for the project is provided by Otak, Inc. An electronic file transfer request may be made to WSPRC.

B. Survey base files will be provided to the Contractor's Surveyor upon request.

C. The Contractor is responsible for all interpretations and use of survey data provided.

D. The Contractor should immediately notify the Owner's Representative upon identification of any conflicts.

1.6 SUBSURFACE INVESTIGATION

A. Subsurface conditions were investigated, findings and recommendations reported in the following geotechnical engineering report in Appendix A:

Commented [BS1]: Provide Geotech report

B. The data on indicated subsurface conditions are not intended as representations or warranties of accuracy of continuity of such conditions between soil borings. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn by the Contractor. The data is made available for convenience of the Contractor.

C. It is the Contractor's sole responsibility, prior to submitting their bid, to determine what soil conditions may be encountered. Test pits or borings and other exploratory operations may be made by the Bidder at no cost to the Owner, but the Bidder must seek prior approval by the Owner. Contractor shall restore all areas disturbed by exploratory operations to existing condition.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 024100 – DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building demolition excluding removal of hazardous materials and toxic substances.

B. Selective demolition of built site elements.

C. Selective demolition of building elements for alteration purposes.

1.2 RELATED REQUIREMENTS

A. Section 010000 – General Requirements: Limitations on Contractor's use of site and premises.

B. Section 015000 – Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 016000 – Product Requirements: Handling and storage of items removed for salvage and relocation.

D. Section 017419 – Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

1.3 DEFINITIONS

A. Demolition: Dismantle, raze, destroy, or wreck any building or structure or any part thereof.

B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.

C. Remove and Salvage: Detach or dismantle items from existing construction in a manner to prevent damage. Clean, package, label and deliver salvaged items to Owner in ready-for-reuse condition.

D. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.

E. Existing to Remain: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.4 REFERENCE STANDARDS

A. NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Site Plan: Indicate:

1. Vegetation to be protected.
2. Areas for temporary construction and field offices.
3. Areas for temporary and permanent placement of removed materials.

C. Project As-Built Drawings: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill Material: See Civil Drawings and Division 31 Specification Sections.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Remove items as noted on Drawings.

B. Remove paving and curbs required to accomplish new work.

C. Remove other items indicated, for salvage, relocation, and recycling.

D. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Division 31 Specification Sections.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.
2. Comply with applicable requirements of NFPA 241.
3. Use of explosives is not permitted.
4. Provide, erect, and maintain temporary barriers and security devices.
5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
7. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.

8. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Do not begin removal until built elements to be salvaged or relocated have been removed.

D. Do not begin removal until vegetation to be relocated has been removed and vegetation to remain has been protected from damage.

E. Protect existing structures and other elements to remain in place and not removed.

1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

F. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

G. Hazardous Materials:

1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.

H. Perform demolition in a manner that maximizes salvage and recycling of materials.

1. Comply with requirements of Section 017419 – Construction Waste Management and Disposal.
2. Dismantle existing construction and separate materials.
3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

I. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.3 EXISTING UTILITIES

A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone. Identify and mark, in same manner as other utilities to remain, utilities to be reconnected.

3.4 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.

1. Verify construction and utility arrangements are as indicated.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from areas that remain occupied or in use.

1. Provide, erect, and maintain temporary dustproof partitions of construction as needed for areas of continued operation or use .

C. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.

D. Remove existing work as indicated and required to accomplish new work.

1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction indicated.
2. Remove items indicated on drawings.

E. Protect existing work to remain.

1. Prevent movement of structure. Provide shoring and bracing as required.
2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch to match new work.

3.5 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove materials not to be reused on site; comply with requirements of Section 017419 – Construction Waste Management and Disposal.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 024120 – SITE DEMOLITION AND RELOCATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Sawcutting and removal or recycling of existing asphalt and cement concrete pavement, gravel surfacing, and other concrete surface features and structures.
2. Demolition and removal or recycling materials and debris; and salvage other existing site features as noted on the Plans.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 01 77 00 – Closeout Procedures
2. Section 02 00 00 – Existing Conditions
3. Section 31 10 00 – Site Clearing
4. Section 31 20 00 – Site Earthwork
5. Section 31 25 00 – Erosion and Sedimentation Control

1.3 REFERENCE DOCUMENTS

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

B. All demolition and removal work shall be in accordance with the Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, Current Edition, Section 2-02, and other sections as specified or applicable.

C. WSDOT/APWA Standard Plans for Road, Bridge and Municipal Construction, Current Edition.

1.4 DEFINITIONS

A. Remove: Remove and legally dispose of items except those indicated by Owner to be salvages, reinstalled, or to remain on the Owner’s property.

B. Remove and Salvage: Items indicated by Owner to be removed and salvaged shall remain on the Owner’s property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner’s designated storage area.

C. Remove and Reinstall: Remove items indicated by Owner; clean, service, and otherwise prepare items for reuse; store and protect against damage. Reinstall items in locations indicated by Owner.

D. Existing to Remain: Protect items identified on plans to remain against damage and soiling during demolition. When permitted by the Owner, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections, for review and acceptance by Owner.

B. Record drawings at Project closeout according to Section 01 77 00 "Closeout Procedures."

1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical improvements.

1.6 QUALITY ASSURANCE AND CONTROLS

A. Regulatory Requirements: Comply with governing EPA, Puget Sound Air Pollution Control Agency (PSAPCA) and local jurisdiction notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Comply with the local noise ordinances regarding hours of operations and allowable noise levels. Monitor vibrations generated by the demolition activities and received by the existing structures in the immediate vicinity of the project.

1.7 MATERIALS OWNERSHIP

A. Except for items or materials indicated by Owner to be reused, salvaged, or otherwise indicated to remain on the Owners property, demolished materials shall become the Contractor’s property and shall be removed and legally disposed of at the Contractor’s expense.

1.8 SCHEDULING

A. Temporary erosion and sediment control (TESC) facilities shall be in place prior to demolition activities.

B. Coordinate demolition schedule with Owner's onsite operations. Notify the Owner’s Representative 48 hours prior to beginning demolition work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 UTILITY SERVICES

A. Utility requirements: Locate, identify, disconnect, and seal or cap off indicated utility services where indicated.

B. Arrange to shut off indicated utilities with Owner's Representative.

3.2 PREPARATION

A. Install traffic control devices prior to construction in the roadway.

B. Conduct demolition operations and remove debris to ensure minimum interference with roads, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct roads, driveways, walkways, or other adjacent occupied or used facilities without permission from Owner's Representative. Provide alternate routes around closed or obstructed traffic ways.

C. Conduct demolition operations to prevent injury to people and damage to facilities to remain. Ensure safe passage of people around demolition area.

1. Install temporary chain link fence (minimum 6-feet high) to secure work area and to prevent unauthorized entry.
2. Erect temporary protection, such as fences, and railings, where required by Owner's Representative.
3. Protect existing improvements, appurtenances, and vegetation to remain.
4. A vertical sawcut shall be made between any existing pavement that is to remain and the portion to be removed. Where sawcutting is required, the sawcut shall be a minimum of 3 inches deep. When the existing pavement is more than 3 inches thick, the portion below 3 inches may be broken after the sawcut is made.

3.3 EXPLOSIVES

A. Explosives: Use of explosives will not be permitted.

3.4 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.

1. Do not create hazardous or objectionable conditions, such as ice, flooding, and pollution, when using water.

2. The Contractor shall be responsible for ensuring that special precautions are undertaken during sawcutting operations in accordance with Department of Ecology guidelines. No concrete (asphalt or cement) or concrete by-products are to be discharged into any storm drain or surface water. Sawcutting operations will increase the pH of water, therefore filtering is not acceptable.

B. Remove and transport debris in a manner that will prevent spillage on site improvements or roads.

3.5 DEMOLITION

A. Filling Below-Grade Areas: Completely fill below-grade areas and voids resulting from demolition of existing facilities shown on the plans with soil materials according to requirements specified in Section 31 20 00 – Site Earthwork.

B. Damages: Promptly repair damage to adjacent facilities caused by demolition operations.

3.6 DISPOSAL AND RECYCLING OF DEMOLISHED MATERIALS

A. Promptly dispose of, or recycle demolished materials: If recycling requires additional time to accomplish, provide for orderly storage of materials.

B. Transport demolished materials off Owner's property and legally dispose of, or recycle material.

END OF SECTION

SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete formwork.

B. Floors and slabs on grade.

C. Concrete reinforcement.

D. Joint devices associated with concrete work.

E. Concrete curing.

1.2 RELATED REQUIREMENTS

A. Section 079200 – Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

1.3 REFERENCE STANDARDS

A. ACI CODE-318 – Building Code Requirements for Structural Concrete and Commentary 2019 (Reapproved 2022).

B. ACI PRC-211.1 – Selecting Proportions for Normal-Density and High Density-Concrete – Guide 2022.

C. ACI PRC-302.1 – Guide to Concrete Floor and Slab Construction 2015.

D. ACI PRC-304 – Heavyweight Concrete: Measuring, Mixing, Transporting and Placing 2020.

E. ACI PRC-305 – Guide to Hot Weather Concreting 2020.

F. ACI PRC-306 – Guide to Cold Weather Concreting 2016.

G. ACI PRC-308 – Guide to External Curing of Concrete 2016.

H. ACI PRC-347 – Guide to Formwork for Concrete 2014 (Reapproved 2021).

I. ACI SPEC-117 – Specification for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).

J. ACI SPEC-301 – Specifications for Concrete Construction 2020.

K. ASTM A615/A615M – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.

L. ASTM A1064/A1064M – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.

M. ASTM C33/C33M – Standard Specification for Concrete Aggregates 2018.

N. ASTM C39/C39M – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.

O. ASTM C94/C94M – Standard Specification for Ready-Mixed Concrete 2022a.

P. ASTM C143/C143M – Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.

Q. ASTM C150/C150M – Standard Specification for Portland Cement 2022.

R. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete 2020.

S. ASTM C173/C173M – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.

T. ASTM C260/C260M – Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).

U. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2019.

V. ASTM C330/C330M – Standard Specification for Lightweight Aggregates for Structural Concrete 2017a.

W. ASTM C494/C494M – Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).

X. ASTM C618 – Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2023.

Y. ASTM C881/C881M – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.

Z. ASTM C1059/C1059M – Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.

AA. ASTM C1240 – Standard Specification for Silica Fume Used in Cementitious Mixtures 2020.

BB. ASTM C1602/C1602M – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.

CC. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.

DD. ASTM D2103 – Standard Specification for Polyethylene Film and Sheeting 2015.

EE. ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs 2018a.

FF. ASTM E1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs 2017.

GG. COE CRD-C 513 – Handbook for Concrete and Cement Corps of Engineers Specifications for Rubber Waterstops 1974.

HH. COE CRD-C 572 – Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop 1974.

II. ICRI 310.2R – Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair 2013.

1.4 SUBMITTALS

A. See Section 013300 Submittal Procedures for submittal requirements.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
2. For membrane-forming, moisture emission-reducing, curing and sealing compound, provide manufacturer's installation instructions,.

C. Mix Design: Submit proposed concrete mix design.

1. Indicate proposed mix design complies with requirements of ACI SPEC-301, Section 4 – Concrete Mixtures.
2. Indicate proposed mix design complies with requirements of ACI CODE-318, Chapter 5 – Concrete Quality, Mixing and Placing.

D. Samples: Submit samples of underslab vapor retarder to be used.

E. Test Reports: Submit report for each test or series of tests specified.

F. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

1.5 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.

1. Maintain one copy of each document on site.

B. Follow recommendations of ACI PRC-305 when concreting during hot weather.

C. Follow recommendations of ACI PRC-306 when concreting during cold weather.

PART 2 - PRODUCTS

2.1 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI PRC-347 to provide formwork that will produce concrete complying with tolerances of ACI SPEC-117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
2. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches (38 mm) of concrete surface.

2.2 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).

1. Type: Deformed billet-steel bars.
2. Finish: Unfinished, unless otherwise indicated.

B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.

1. Form: Coiled Rolls.
2. WWR Style: 4 x 8-W6 x W10 (102 x 203-MW39 x MW65).

C. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch (1.29 mm).
2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I – Normal Portland type.

1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.

1. Acquire aggregates for entire project from same source.

C. Lightweight Aggregate: ASTM C330/C330M.

D. Fly Ash: ASTM C618, Class C or F.

E. Calcined Pozzolan: ASTM C618, Class N.

F. Silica Fume: ASTM C1240, proportioned in accordance with ACI PRC-211.1.

G. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.4 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

G. Accelerating Admixture: ASTM C494/C494M Type C.

H. Retarding Admixture: ASTM C494/C494M Type B.

I. Water Reducing Admixture: ASTM C494/C494M Type A.

J. Shrinkage Reducing Admixture:

1. ASTM C494/C494M, Type S.

2.5 ACCESSORY MATERIALS

A. Underslab Vapor Retarder:

1. Sheet Material: ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single-ply polyethylene is prohibited.
2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.

2.6 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.

B. Epoxy Bonding System:

1. Complying with ASTM C881/C881M and of Type required for specific application.

C. Waterstops: Rubber, complying with COE CRD-C 513.

D. Waterstops: PVC, complying with COE CRD-C 572.

E. Waterstops: Bentonite and butyl rubber.

F. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.

1. Material: ASTM D1751, cellulose fiber.

G. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.

2.7 CURING MATERIALS

A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.

B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

C. Moisture-Retaining Sheet: ASTM C171.

D. Polyethylene Film: ASTM D2103, 4 mil, 0.004 inch (0.102 mm) thick, clear.

2.8 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended or required by manufacturer.

C. Normal Weight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch (27.6 MPa).
2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
3. Silica Fume Content: Maximum 15 percent of cementitious materials by weight.
4. Water-Cement Ratio: Maximum 45 percent by weight.
5. Total Air Content: 6 percent, determined in accordance with ASTM C173/C173M.
6. Maximum Slump: 3 inches (75 mm).
7. Maximum Aggregate Size: 3/4 inch (19 mm).

2.9 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the amount held back from the plant mix, as indicated on the batch ticket.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of subgrade are correct.

C. Subgrade Compaction: Confirm slab subgrade is compacted to 95 percent of maximum dry density.

D. Formwork: Comply with requirements of ACI SPEC-301. Design and fabricate forms to support all applied loads until concrete is cured and for easy removal without damage to concrete.

E. Verify that forms are clean and free of rust before applying release agent.

F. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

G. Prepare existing concrete surfaces to be repaired according to ICRI 310.2R.

H. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.

1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
2. Use latex bonding agent only for non-load-bearing applications.

I. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches (150 mm). Seal joints, seams, and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI SPEC-301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

3.4 PLACING CONCRETE

A. Place concrete in accordance with ACI PRC-304.

B. Place concrete for floor slabs in accordance with ACI PRC-302.1.

C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.5 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch (5 mm) thick blade and cut at least 1 inch (25 mm) deep but do not cut top bar of mat foundation.

E. Contraction Joint Devices: Use preformed joint device, with top set flush with top of slab.

3.6 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:

1. Exposed Concrete Floors: 1/4 inch (6 mm) in 10 feet (3 m).
2. Under Seamless Resilient Flooring: 1/4 inch (6 mm) in 10 feet (3 m).
3. Under Carpeting: 1/4 inch (6 mm) in 10 feet (3 m).

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.7 CONCRETE FINISHING

A. Repair surface defects immediately after removing formwork.

B. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. Provide finish as follows:

1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

C. Concrete Slabs: Finish to requirements of ACI PRC-302.1 and as follows:

1. Other Surfaces to Be Left Exposed: Trowel as described in ACI PRC-302.1, minimizing burnish marks and other appearance defects.
2. Finish: Medium broom finish.

D. In areas with drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.8 CURING AND PROTECTION

A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than seven days.

C. Surfaces Not in Contact with Forms:

1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.

a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
b. Spraying: Spray water over floor slab areas and maintain wet.
c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.

2. Final Curing: Begin after initial curing but before surface is dry.

a. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.9 FIELD QUALITY CONTROL

A. Provide free access to concrete operations at project site and cooperate with appointed firm.

B. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards (76 cu m) or less of each class of concrete placed.

C. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

D. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Owner and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances, or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Owner. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Owner for each individual area.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 033353 – MISCELLANEOUS SITE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies cast-in place concrete for site paving and concrete site elements, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 01 00 00 – General Requirements
2. Section 31 20 00 – Site Earthwork

1.3 RELATED DOCUMENTS

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

B. All work in this section shall be in accordance with the Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, Current Edition.

1.4 DEFINITIONS

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

1.5 REFERENCES

A. Comply with the provisions of the following unless otherwise required. Contractor responsibility to provide Work complying with contract requirements shall not be altered by statements made in reference standards and documents. Should conflicts occur between these referenced standards and the Project requirements, the most restrictive requirement shall govern.

B. American Association of State highway and Transportation Officials, (AASHTO)

1. AASHTO M 148 – Standard Specification for Liquid membrane-Forming Compounds for Curing Concrete

2. AASHTO M 182 – Standard Specification for Burlap Cloth made from Jute or Kenaf and Cotton Mats

C. American Concrete Institute, (ACI).

1. ACI 117 – Specification for Tolerances for Concrete Construction and Materials
2. ACI 301 – Specifications for Structural Concrete for Building
3. ACI 605 – Standard Recommended Practice for Hot Weather Concreting

D. American Society for Testing and Materials, (ASTM).

1. ASTM A 36 –Standard Specification for Carbon Structural Steel
2. ASTM A 82 –Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
3. ASTM A-307 –Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000PSI Tensile Strength
4. ASTM A 497 –Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
5. ASTM A 615 –Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
6. ASTM C 31 –Standard Practice for Making and Curing Concrete Test Specimens in the Field
7. ASTM C 33 –Standard Specification for Concrete Aggregates
8. ASTM C 39 –Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
9. ASTM C 42 –Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
10. ASTM C 94 –Standard Specification for Ready Mix Concrete
11. ASTM C 143 –Standard Test Method for Slump of Hydraulic-Cement Concrete
12. ASTM C 150 –Standard Specification for Portland Cement
13. ASTM C 173 –Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
14. ASTM C 231 –Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
15. ASTM C 260 –Standard Specification for Air Entraining Admixtures for Concrete
16. ASTM C 309 –Standard Specification for Liquid membrane Forming Compounds for Curing Concrete
17. ASTM C 494 –Standard Specification for Chemical Admixtures for Concrete
18. ASTM C 618 –Standard Specification for Coal Fly Ash and Raw or Calcined natural Pozzolan for Use in Concrete
19. ASTM C 920 –Standard Specification for Elastomeric Joint Sealants
20. ASTM C 989 –Standard Specification for Slag Cement for use in Concrete and Mortars
21. ASTM C 1064 –Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
22. ASTM C 1330 –Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
23. ASTM D1557 –Standard Test Methods for laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3)
24. ASTM D 3575 –Standard Test Methods for flexible Cellular materials Made From Olefin Polymers
25. ASTM D 4397 –Standard Specification for Polyethylene Sheeting for Construction, industrial, and Agricultural Applications

26. ASTM E 1643 –Standard practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs
27. ASTM E 1745 –Standard specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs

1.6 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mix water to be withheld for later addition at Project site.
2. Include substantiating substantial test data to show compliance with ACI 318 Chapter 5.

C. Steel Reinforcement Shop Drawings: Steel reinforcement shop drawings shall contain sufficient detail and information to allow complete fabrication and installation of the reinforcing steel without reference to the contract drawings either on the fabrication shop floor or at the project site. The steel reinforcement detailer shall generate all shop drawing bending and installation details from the structural and architectural drawings and specifications. The use of reproductions or photocopies of the contract drawings shall not be permitted. Submit prior to placement of reinforcement with sufficient time for review and return.

D. Provide details of fabrication, bending, and placement, prepared according to ACI 315, “Details and Detailing of Concrete Reinforcement.” Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

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

1. Location of construction joints is subject to approval of the Owner’s Representative.

F. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Curing materials.
5. Floor and slab treatments.
6. Vapor barriers.
7. Semi-rigid joint filler.
8. Joint-filler strips.
9. Repair materials.

G. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and 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 94/C94M 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, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician – Grade 1. Testing Agency laboratory supervisor shall be an 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 one source, and obtain admixtures through one source from a single manufacturer.

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

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

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending, soiling, contamination, and damage.

1.9 SYSTEM DESCRIPTION

A. Redesign or Departures from Requirements of the Contract Documents Initiated by Contractor:

1. Obtain written acceptance from the Owner.
2. Bear costs for Contractor-initiated or construction error due to changes in type, form, system, or details of construction from those indicated by the contract documents.
3. Costs of review of such changes by the Owner will be deducted from the Contract Sum by Change Order.

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: For concrete not exposed to public view upon completion. Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. 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.

D. 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 the exposed concrete surface.
2. Furnish ties that, when removed, will leave holes not larger than 1 inch (25 mm) in diameter in concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60 deformed. Refer to General Structural Notes.

B. Low-Alloy-Steel Reinforcing Bars: All reinforcing steel to be welded or bent in field: ASTM A 706/A 706M, deformed.

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

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars 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 fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete 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 or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I/II.

1. Fly Ash: ASTM C 618, Class C or F. Refer to General Structural Notes.
2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

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

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

1. Maximum Coarse-Aggregate Size: 1-inch for concrete pavement to receive a broom finish, refer to Drawings for location.
2. Aggregate for concrete to receive an exposed aggregate finish shall conform to AASHTO Grading No. 7:

Passing Sieve Size	AASHTO Grading No. 7	
	Minimum	Maximum
3/4″	99	100
1/2″	90	100
3/8″	40	70
No. 4	0	15
No. 8	0	5

D. Water: Potable and complying with ASTM C 94/94M.

E. Regional Materials: Aggregates shall be extracted, harvested, or recovered, as well as manufactured, from materials within 500 miles of Project site.

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/ C494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing & Retarding Admixture: ASTM C494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
7. Non-Chloride, Non-Corrosive Accelerating Admixture: The admixture shall conform to ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures.
8. Mid-range water reducing admixture shall be EUCON X15 or EUCON MR by The Euclid Chemical Company, DARACEM or Mira Series by W. R. Grace or POZZOLITH997 or Rheobuild 3000 by Master Builders and shall conform to ASTM C494 Type A.

B. Admixtures of any type shall not be used unless identified in the approved mix design.

2.6 CURING MATERIALS

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

1. Products:

a. BASF Construction Chemicals – Building Systems; Confilm
b. Dayton Superior Corporation; Sure Film
c. Euclid Chemical Company (the); Eucobar
d. Meadows, W.R., Inc.; Sealtight Evapre
e. Sika Corporation, Inc.; SikaFilm
f. Or approved equal

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) dry.

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

D. Water: Potable.

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

1. Products:

a. BASF Construction Chemicals – Building Systems; Kure 200
b. ChemMasters; Safe-Cure Clear
c. Conspec by Dayton Superior; W.B. Resin Cure
d. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W)
e. Meadows, W. R., Inc.; 1100-CLEAR
f. SpecChem, LLC; Spec Rez Clear
g. Or approved equal

2.7 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 and in accordance with the following:

1. Compressive Strength: Refer to the Standard Specifications.
2. Maximum Water-Cementitious Materials Ratio: Refer to the Standard Specifications.
3. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having the air content specified in the General Structural Notes.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 35 percent, maximum replacement.

C. Limit water-soluble, chloride-ion content in mixed concrete to percentage allow by the Standard Specifications.

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

1. Use high-range water-reducing or plasticizing admixture or high-range water-reducing admixture (superplasticizer) 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 mixes where indicated

2.8 RELATED MATERIALS

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

B. Flexible Joint Sealant: One-component nonpriming, self-leveling elastomeric polyurethane.

C. Bonding Agent: ASTM C 1059, 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 grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Sand for Joint Sealant Application: Double-washed builders' fine sand in the gray color range.

2.9 FABRICATING REINFORCEMENT

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

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

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

PART 3 - EXECUTION

3.1 SITE AND ENVIRONMENTAL PROCEDURES

A. Waste Management: As specified in Section 017419, "Construction Waste Management and Disposal" and as follows:

1. Formwork: Reuse forms to greatest extent possible without damaging structural integrity of concrete and without damaging aesthetics of exposed concrete.
2. Mixing Equipment: Return excess concrete to supplier; minimize water used to wash equipment
3. Moisture Curing: Prevent water run-off.
4. Hardened Cured Waste Concrete: May be crushed and reused as fill or as a base course for pavement.

3.2 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 concrete 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. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces
2. Class B, 1/4 inch for rough-formed finished surfaces

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

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

F. 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.

G. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and determine sizes and locations from trades providing such items.

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

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

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

K. All formwork surfaces that will provide the finish surface of exposed concrete must be accepted by the Owner before depositing concrete.

3.3 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 bolts, accurately located, to elevations required.

3.4 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 provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

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.

3.5 STEEL REINFORCEMENT

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

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

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

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. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.

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

E. Install welded wire fabric 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 or Owner's Representative.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated

2. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible
3. Use a bonding agent or roughen interface to 1/4-inch amplitude 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: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8-inch. 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 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. 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, plate dowels 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 where applicable, Lubrication not required for plate dowels.

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 the Owner.

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

C. Adjust mix as required to maintain specified air content at the point of discharge.

D. Deposit concrete continuously or in 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 specified. 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, free of humps or hollows, before excess moisture or 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 air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
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 mix designs.

G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to 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. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. 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 defective areas. Remove fins and other projections specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to view or to be covered with a coating or covering material applied directly to concrete.

B. 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 view.

C. 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 recommendations in ACI 302.1R 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. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

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

C. Trowel Finish: After applying float finish, apply first trowel finish 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 and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, or another thin film-finish coating system
2. Finish surfaces to the following tolerances, measured within 72 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:

a. Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17; for slabs-on-grade.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, parking, stair treads 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 CONCRETE PROTECTION 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 with recommendations in ACI 305R 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. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:

1. 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.

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 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 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 a 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. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer

4. Curing and Sealing Compound: Apply uniformly to 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.
5. Minimum curing periods:

a. High-early strength mixes, if used: 3 days.
b. All other mixes, 7 days.

3.11 JOINT FILLING

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. 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. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.

C. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

D. Install semi-rigid epoxy joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 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 (1.2-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 in solid concrete but not less than 1 inch (25 mm) in depth. 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. Submit repair plan to Architect for approval prior to beginning repairs.

1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, 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 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.

3.13 FIELD QUALITY CONTROL

A. Testing and Inspecting: The Contractor is responsible for all quality control testing and reports, including all testing and inspections as required in the contract documents. Owner may engage a qualified testing agency to perform field tests and inspections.

B. Testing Agency: Engage a qualified independent testing and inspecting agency to perform tests, and inspections and to submit test reports.

C. Inspections: As indicated in the Statement of Structural Tests and Inspections.

D. Concrete Testing Services: 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 at least one composite sample for each 500 cu. yd. (38 cu. m) or fraction thereof of each concrete mix placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
4. Concrete Temperature: ASTM C 1064; 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.
5. 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 mix.
6. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.

    a. Cast and field cure one set of four standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39; 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.

8. 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.

9. Strength of each concrete mix 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).
10. 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 mix proportions and materials, compressive breaking strength, type of break for both 7-and 28-day tests, and air content
11. 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.
12. 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 Contracting Officer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
13. Slab Leveling and Flatness Testing: Testing and inspecting agency shall test each bay of each floor for conformance to specified tolerance.

3.14 DEFECTIVE WORK

A. If Tests indicate that Concrete has failed to meet the specifications, replace the substandard material, unless otherwise directed by Contracting Officer.

B. Additionally, remove and replace the following:

1. Surfaces which show excessive shrinkage cracks or crazing.
2. Concrete exceeding specified allowable tolerances
3. Work determined by Contracting Officer to be unacceptable

C. Remove and replace honeycombed and other defective concrete down to sound concrete and replace. If chipping is necessary, shape edges perpendicular to Surface or slightly undercut. Do not feather edges.

END OF SECTION

SECTION 033543 – POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes polished concrete finishing.

1. Includes multi-step grinding, chemical treatment for hardening, multi-step polishing, and finishing treatment for protection for existing concrete slabs.

2. Includes patching and repair prior to polishing.

3. Includes concrete staining.

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for concrete materials, coordination of mix design, aggregates, placements procedures, and curing requirements for concrete slabs indicated for polished concrete finish.

1.3 DEFINITIONS

A. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of polished concrete.

1.4 PREINSTALLATION MEETINGS

A. 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 polished 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. Cast-in-place concrete subcontractor.
e. Polished concrete finishing Subcontractor.

2. Review curing procedures, construction joints, joint finishing, concrete repair procedures, concrete finishing, and protection of polished concrete.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: For each type of product.

C. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.

D. Samples for Initial Selection: For each type of product requiring color selection.

E. Samples for Verification: For each type of exposed color.

F. Qualification Data: For Installer.

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

1. Repair materials.
2. Stain materials.
3. Liquid floor treatments.

1.6 QUALITY ASSURANCE

A. Special Finish Concrete Work: Performed by expert entity having in-depth knowledge of a wide variety of finish methods and equipment suitable for the type of finish in the locations required for the Work. Applicator shall be approved by the manufacturer of the required finishing system and have a successful record of experience with this finish process and the equipment proposed for the Work. Submit documentation for five previous projects including equipment and methods used and the name of the equipment operator(s), complete information on the finishing process and photographic documentation of finishing from original surface to completion.

1. Individual in Responsible Control: For work of this Section have ACI Craftsman Certification as Commercial/Industrial Flatwork Specialist – High Tolerance; individual shall be on site at all times work is actively in progress.

B. Field Sample Panels: After approval of verification sample and before casting concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, approximately 48 by 48 inches minimum, to demonstrate the expected range of finish, color, and appearance variations.

1. Locate panels as indicated or, if not indicated, as directed by Architect.
2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
3. Demolish and remove field sample panels when directed.

C. Mockups: Before casting concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Demonstrate curing, finishing, and protecting of polished concrete.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Polish Level: Provide polished concrete surfaces meeting the following criteria, as determined by Concrete Sawing and Drilling Assoc. (CSDA) standard CSDA-ST-115 Measuring Concrete Micro Surface Texture:

1. Surface Texture Grade (STG): B-3; 64 microinches (µin).
2. Surface Grade: Hone Smooth.
3. Final Grit: 400 grit; high sheen.

B. Aggregate Level: Provide polished concrete surfaces meeting the following criteria, as determined by Concrete Polishing Assoc. of America. (CPAA) standard:

1. Class B: 1/16-inch approximate depth of cut.
2. Fine Aggregate; Fine aggregate exposure with little or no medium aggregate exposure at random locations.

C. Clarity and Gloss: Provide polished concrete surfaces meeting the following criteria, as determined by Concrete Polishing Assoc. of America. (CPAA) standard:

1. Clarity/ Gloss Level: Level 2 to 3, dependent upon approved mockup.
2. Reflective Clarity: Not less than 50 as tested per ASTM D 5767.
3. Reflective Sheen (Gloss): 30-40 as tested per ASTM D 523.

D. Finished Surface Coefficient of Friction: Not less than 0.60 Static Coefficient of Friction (SCOF) and 0.40 Dynamic Coefficient of Friction (DCOF) on non-sloped surfaces as tested per ANSI/ NFSI B101.1 and B101.3.

E. Stain-Resistant: Shall provide stain resistance as defined in ASTM D 1308.

2.2 LIQUID FLOOR TREATMENTS, CONC-1

A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

B. Basis-of-Design Finishing System: Retroplate Concrete Polishing System by Retroplate; www.retroplatesystem.com.

C. Other Acceptable Finishing Systems:

1. Euco Diamond Hard by Euclid Chemical Co.; www.euclid.com.
2. Hiperfloor Commercial Finish by Husqvarna; www.husqvarna.com.
3. FGS PermaShine by L&M Construction Chemicals, Inc., Div. of Laticrete International, Inc.; www.fgs-permashine.com.
4. Consolideck System by Prosoco, Inc.; www.prosoco.com.

D. Polish Level, Aggregate Level, Clarity and Gloss: Refer to Performance Requirements articles above.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to starting work identify floor finishing values of slab in each area where diamond polish finish is required and verify compliance with requirements in Section 033000 "Cast-in-Place Concrete". Correct areas that deviate beyond specified tolerance until they are brought into compliance.

1. Utilize grout mortar forced into the pore structure of the concrete substrate to fill cracks and surface imperfections.
2. Provide coordination with subsequent work to ensure finished concrete is without damage and deterioration at Substantial Completion.

B. Joints: Coordinate joint location and installation with work of Section 033000 "Cast-in-Place Concrete"; provide for joint treatments as work of this Section.

1. Utilize compressible joint filler to fill joints to prevent the infiltration of debris and provide support for sealants applied to the exposed surface; refer to Section 079200 "Joint Sealants" for requirements.

3.2 POLISHING

A. General: Avoid hand tools to greatest extent possible for consistent finish and control. Grind, hone and polish using grits required to achieve approved finish.

B. Apply penetrating liquid floor treatment to cured and prepared slabs to match approved mockup.

C. Machine grind floor surfaces to receive polished finishes level and smooth and to depth required to reveal aggregate to match approved mockup.

1. Perform finishing operations in as continuous an operation as possible. Provide uniform appearance throughout the finished Work.
2. Provide edge grinding at floor and ramp perimeters, and at stair treads and risers.

D. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.

E. Continue polishing with progressively finer-grit diamond polishing pads to finish level specified, to match approved mockup.

1. Provide edge polishing at floor and ramp perimeters and stair treads and risers.
2. Control and dispose of waste produced by grinding and polishing operations.
3. Neutralize and clean polished floor surfaces.

F. Apply liquid floor sealer to ground, treated and polished slabs to match approved mockup.

3.3 STAINING

A. Provide measuring and evaluation of texture of concrete micro surface texture in accordance with CSDA-ST-115 Measuring Concrete Micro Surface Texture as work of this Section.

B. Slip Resistance Traffic Surface: Evaluate finished flatwork per ANSI B101.1 Static Coefficient of Friction and B101.3 Dynamic Coefficient of Friction for compliance with requirements.

1. Flatness and level: FF 50 and FL 30 with minimum values not less than FF 35 and FL 20; evaluated per ACI 117 and ASTM E 1155.
2. Reflective Clarity and Gloss: Evaluate per ASTM D 5767 and ASTM D 523 following surface refinement prior to and additional work other than the specified finish treatment.

C. Review recommendation of the manufacturer of the specified finish system materials for the finish floors including products, procedures and frequency.

3.4 CLEANING AND PROTECTION

A. Clean and protect floor finishes from damage during remaining construction period.

B. Coordinate subsequent work to ensure finished concrete is free from damage and deterioration at Substantial Completion.

END OF SECTION

SECTION 044313 – STONE MASONRY VENEER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Anchored cut stone veneer at exterior walls.

B. Metal anchors and accessories for anchored veneer.

C. Accessories for adhered veneer.

D. Setting mortar.

1.2 RELATED REQUIREMENTS

A. Section 072500 – Weather Barriers: Water-resistive barrier over sheathing.

B. Section 076200 – Sheet Metal Flashing and Trim: Flashings.

C. Section 079200 – Joint Sealants: Sealing joints indicated to be left open for sealant.

1.3 REFERENCE STANDARDS

A. ANSI A118.15 – American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2019.

B. ASTM A580/A580M – Standard Specification for Stainless Steel Wire; 2023.

C. ASTM A666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM C270 – Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

E. ASTM C932 – Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering; 2006 (Reapproved 2019).

F. ASTM C1242 – Standard Guide for Selection, Design, and Installation of Dimension Stone Attachment Systems; 2022a.

G. ASTM C1515 – Standard Guide for Cleaning of Exterior Dimension Stone, Vertical And Horizontal Surfaces, New or Existing; 2020.

H. ASTM C1528/C1528M – Standard Guide for Selection of Dimension Stone; 2020.

I. TMS 402/602 – Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures, for submittal requirements.

B. Product Data: Provide data on stone units, mortar, and reinforcement.

C. Samples: Submit two stone samples illustrating minimum and maximum stone sizes, color range, texture, and markings.

D. Samples: Submit mortar color samples.

E. Stone Fabricator's Qualification Statement.

F. Installer's Qualification Statement.

G. NSI Installer Qualification: Documentation of Natural Stone Institute Accreditation.

1.6 QUALITY ASSURANCE

A. Stone Fabricator Qualifications: Company specializing in fabricating cut stone with minimum ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type required by this section, with minimum seven years of documented experience.

C. Installer Qualifications: Natural Stone Institute (NSI) Accredited Commercial B Contractor (light commercial); www.naturalstoneinstitute.org/#sle.

1.7 MOCK-UP

A. Construct stone wall mock-up, 8 feet (2.44 m) long by 3 feet (0.914 m) high; include stone anchor accessories, sill and head flashings, corner condition, and door frame in mock-up.

B. See Section 014000 – Quality Requirements for additional requirements.

C. Mock-up may remain as part of the Work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect stone from discoloration during storage on site.

B. Provide ventilation to prevent condensation from forming on stone.

1.9 FIELD CONDITIONS

A. Maintain materials and ambient air at minimum of 40 degrees F (5 degrees C) prior to, during, and for 48 hours after completion of work.

PART 2 - PRODUCTS

2.1 STONE

A. Stone, General: See recommendations in ASTM C1528/C1528M.

B. Stone: Varied to match stone at base of existing park restroom facility.

1. Colors: Match stone color at base of existing park restroom facility.
2. Surface Finish: Match stone finish at base of existing park restroom facility.

2.2 MORTAR APPLICATIONS

A. At Contractor's option, mortar may be field-mixed from packaged dry materials, made from factory premixed dry materials with addition of water only, or ready-mixed.

B. Mortar Color: Natural gray unless otherwise indicated.

C. Dash Bond Coat: One part Portland cement, with maximum two parts sand.

D. Setting Bed Mortars: Setting bed used to adhere stone veneer units to scratch coat mortar or to bondable concrete or concrete masonry.

1. Site-Mixed: ASTM C270, Type S,.
2. Prepackaged/Preblended Latex Modified: ANSI A118.4 or ANSI A118.15.

E. Pointing Mortars: Pointing or grouting mortars used to fill the joints between individual stone veneer units once the setting bed mortar has sufficiently cured.

1. Site-Mixed: ASTM C270, Type N or Type S.
2. Prepackaged/Preblended Latex Modified: ANSI A118.4 or ANSI A118.15.
3. Color: Mineral oxide pigment; color as selected from manufacturer's standard mortars available.

2.3 MORTAR MIXES

A. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.

1. Manufacturers:

a. ARDEX Engineered Cements; ARDEX X 77 MICROTEC: www.ardexamericas.com/#sle.
b. LATICRETE International, Inc; LATICRETE MVIS Hi-Bond Veneer Mortar: www.laticrete.com/#sle.
c. Substitutions: See Section 016000 – Product Requirements.

B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

C. Mixing: Use mechanical batch mixer and comply with referenced standards.

2.4 ACCESSORIES – ANCHORED VENEER

A. Wall Ties: Formed steel wire, stainless steel complying with ASTM A580/A580M, eye and pintle type, with provision for vertical adjustment after attachment.

B. Other Anchors in Direct Contact with Stone: ASTM A666 Type 304, stainless steel, of sizes and configurations required for support of stone and applicable superimposed loads.

C. Flashings: See Section 076200.

D. Back Coating:

1. Bituminous.

E. Cleaning Solution: Type that will not harm stone, joint materials, or adjacent surfaces.

2.5 ACCESSORIES – ADHERED VENEER

A. Water-Resistive Barrier: See Section 072500.

B. Flashings: See Section 076200.

C. Bonding Compound: Provide type recommended for bonding scratch coat to solid surfaces, complying with ASTM C932.

D. Cleaning Solution: Type that will not harm stone, joint materials, or adjacent surfaces.

2.6 STONE FABRICATION – ANCHORED VENEER

A. Nominal Thickness: Match thickness of stone at base of existing park restroom facility.

B. Nominal Face Size: Match nominal face size of stone at base of existing park restroom facility.

C. Pattern and Coursing: Match pattern and coursing of stone at base of existing park restroom facility.

D. Fabricate for beds and joints to match stone at base of existing park restroom facility.

E. Backs: Rough or split.

F. Form stone corners to irregular joint profile. Clean jagged corners from stone in preparation for setting.

G. Slope exposed top surfaces of stone and horizontal sill surfaces for shedding water.

H. Cut drip slot in bottom surface of work projecting more than 1/2 inch (13 mm) over concrete. Size slot not less than 3/8 inch (10 mm) wide and 1/4 inch (6 mm) deep for full width of projection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that support work and site conditions are ready to receive work of this section.

1. Per ASTM C1242, exterior walls to receive thin natural stone veneers should be designed with a stiffness ratio of L/1000 minimum.

B. Verify that substrates to receive mortar scratch coat or setting bed comply with stone veneer manufacturer's instructions.

1. Concrete: Verify surfaces are flat, honeycomb is filled flush, and surface is ready to receive mortar setting bed. Verify no bituminous, water repellent, or form release agents exist on concrete surface that are detrimental to mortar setting bed.

C. Verify that items built-in under other sections are properly located and sized.

3.2 PREPARATION – ANCHORED VENEER

A. Establish lines, levels, and coursing. Protect from disturbance.

B. Clean stone prior to installation. Do not use wire brushes or implements that mark or damage exposed surfaces.

C. Clean sawn surfaces of rust stains and iron particles.

D. Coat back surfaces not to be in contact with setting mortar with back coating material. Allow coating to cure.

3.3 INSTALLATION – ANCHORED VENEER

A. Install flashings of longest practical length and seal watertight to back-up. Lap end joints minimum 6 inches (150 mm) and seal watertight.

B. Cut stone at site to produce clean faces.

C. Size stone units to fit opening dimensions and perimeter conditions.

D. Wet absorptive stone in preparation for placement to minimize moisture suction from mortar.

E. Arrange stone pattern to provide color uniformity and minimize visual variations to match stone at base of existing park restroom facility.

F. Provide setting and pointing mortar.

1. If water is lost by evaporation, re-temper mortar only within two hours after mixing.
2. At ambient air temperature 80 degrees F (26 degrees C) and above, use mortar within two hours after mixing; at ambient air temperature below 50 degrees F (10 degrees C), use mortar within two-and-one-half hours after mixing.

G. Arrange stone coursing in bond with consistent joint width to match stone at base of existing park restroom facility.

H. Set stone in full mortar setting bed to fully support stone over bearing surface. Use setting buttons or shims to maintain correct joint width.

3.4 REINFORCEMENT AND ANCHORAGE – ANCHORED VENEER

A. Embed wall ties in masonry back-up to bond veneer to back-up at maximum 16 inches (400 mm) on center vertically and 36 inches (900 mm) on center horizontally.

B. In addition, place wall ties at maximum 3 inches (75 mm) on center each way around perimeter of openings, within 12 inches (300 mm) of openings.

3.5 JOINTS – ANCHORED VENEER

A. Rake out mortar joints 5/8 to 3/4 inch (16 to 19 mm) and brush joints clean to accommodate pointing mortar. Fill joints with pointing mortar.

B. Pack mortar into joints and work into voids. Neatly tool surface to concave joint.

C. At joints to be sealed, clean mortar out of joint before it sets. Brush joints clean.

3.6 INSTALLATION – MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

B. Extend metal flashings through exterior face of stone and terminate in an angled drip with hemmed edge.

C. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with flashing sealant/adhesive.

3.7 CONTROL AND EXPANSION JOINTS

A. Form joints as detailed on drawings.

3.8 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet (6 mm in 3 m) and 1/2 inch in 20 feet (13 mm in 6 m) or more.

C. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.

D. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet (3 mm in 1 m).

3.9 CLEANING

A. Remove excess mortar as work progresses, and upon completion of work.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Clean exterior stone per ASTM C1515.

E. Use non-metallic tools in cleaning operations.

3.10 PROTECTION

A. During temporary storage on site, at the end of working day, and during rainy weather, cover stone work exposed to weather with non-staining waterproof coverings, securely anchored.

END OF SECTION

SECTION 051200 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members.

B. Grouting under base plates.

1.2 RELATED REQUIREMENTS

A. Section 055000 – Metal Fabrications: Steel fabrications affecting structural steel work.

1.3 REFERENCE STANDARDS

A. AISC (MAN) – Steel Construction Manual 2017.

B. AISC 303 – Code of Standard Practice for Steel Buildings and Bridges 2022.

C. AISC 325 – Steel Construction Manual 2017.

D. ASTM A36/A36M – Standard Specification for Carbon Structural Steel 2019.

E. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.

F. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

G. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

H. ASTM A242/A242M – Standard Specification for High-Strength Low-Alloy Structural Steel 2013 (Reapproved 2018).

I. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.

J. ASTM A449 – Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use 2014 (Reapproved 2020).

K. ASTM A500/A500M – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

L. ASTM A563/A563M – Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric) 2021a.

M. ASTM A572/A572M – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel 2021, with Editorial Revision.

N. ASTM A588/A588M – Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance 2019.

O. ASTM A992/A992M – Standard Specification for Structural Steel Shapes 2022.

P. ASTM A1008/A1008M – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.

Q. ASTM C1107/C1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.

R. ASTM E164 – Standard Practice for Contact Ultrasonic Testing of Weldments 2019.

S. ASTM E709 – Standard Guide for Magnetic Particle Testing 2021.

T. ASTM F436/F436M – Standard Specification for Hardened Steel Washers Inch and Metric Dimensions 2019.

U. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength 2020.

V. ASTM F3125/F3125M – Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2022.

W. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.

X. AWS B2.1/B2.1M – Specification for Welding Procedure and Performance Qualification 2021.

Y. AWS D1.1/D1.1M – Structural Welding Code – Steel 2020, with Errata (2022).

Z. SSPC-Paint 20 – Zinc-Rich Coating (Type I – Inorganic, and Type II – Organic) 2019.

AA. SSPC-SP 1 – Solvent Cleaning 2015, with Editorial Revision (2016).

BB. SSPC-SP 2 – Hand Tool Cleaning 2018.

CC. SSPC-SP 3 – Power Tool Cleaning 2018.

DD. UL (FRD) – Fire Resistance Directory Current Edition.

1.4 SUBMITTALS

A. See Section 013000 – Administrative Requirements, for submittal procedures.

B. Shop Drawings:

1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

E. Fabricator's Qualification Statement.

1.5 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

C. Design connections not detailed on drawings 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Angles and Plates: ASTM A36/A36M.

B. Steel W Shapes and Tees: ASTM A992/A992M.

C. Rolled Steel Structural Shapes: ASTM A992/A992M.

D. Steel Shapes, Plates, and Bars: ASTM A242/A242M high-strength, corrosion-resistant structural steel.

E. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.

F. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.

G. Pipe: ASTM A53/A53M, Grade B.

H. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.

I. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.

J. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563/A563M nuts and ASTM F436/F436M Type 1 washers.

K. Headed Anchor Rods: ASTM F1554 Grade 36, plain.

L. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

M. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch (13.7 MPa).
2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch (48 MPa).

2.2 FABRICATION

A. Shop fabricate to greatest extent possible.

B. Fabricate connections for bolt, nut, and washer connectors.

2.3 FINISH

A. Galvanize structural steel members to comply with ASTM A123/A123M. Provide minimum 1.7 oz/sq ft galvanized coating. (Provide minimum 530 g/sq m galvanized coating.)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION

A. Erect structural steel in compliance with AISC 303.

B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Do not field cut or alter structural members without approval of Architect.

D. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.3 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

END OF SECTION

SECTION 055000 – METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

A. Section 033000 – Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 051200 – Structural Steel Framing: Structural steel column anchor bolts.

1.2 SUMMARY

A. Comply with Contract Build America, Buy America Provisions.

1.3 REFERENCE STANDARDS

A. ASTM A36/A36M – Standard Specification for Carbon Structural Steel 2019.

B. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.

C. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

D. ASTM A283/A283M – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.

E. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.

F. ASTM A501/A501M – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.

G. ASTM A666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

H. ASTM F3125/F3125M – Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2022.

I. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.

J. AWS B2.1/B2.1M – Specification for Welding Procedure and Performance Qualification 2021.

K. AWS D1.1/D1.1M – Structural Welding Code – Steel 2020, with Errata (2022).

L. AWS D1.2/D1.2M – Structural Welding Code – Aluminum 2014, with Errata (2020).

M. SSPC-Paint 15 – Steel Joist Shop Primer/Metal Building Primer 2004.

N. SSPC-Paint 20 – Zinc-Rich Coating (Type I – Inorganic, and Type II – Organic) 2019.

O. SSPC-SP 2 – Hand Tool Cleaning 2018.

1.4 SUBMITTALS

A. See Section 013000 – Submittal Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.5 QUALITY ASSURANCE

A. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

PART 2 - PRODUCTS

2.1 MATERIALS – STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, hot-dip galvanized finish.

E. Stainless Steel, General: ASTM A666, Type 304.

F. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

G. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

J. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I – Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. 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.

D. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FABRICATED ITEMS

A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

2.4 FINISHES – STEEL

A. Prime paint steel items.

1. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating. (Provide minimum 530 g/sq m galvanized coating.)

2.5 FABRICATION TOLERANCES

A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).

C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).

D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).

E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

2.6 QUALIFIED PRODUCTS LIST

A. When a product meeting the Contract requirements is listed on the (state agency) QPL, the Contractor shall select a qualified and BABA-compliant product from the approved list. The Contractor shall still obtain Certificate of Materials Origin for QPL listed products.

2.7 SUBSTITUTION PROCEDURES

A. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor. (Note: this may be subject to a non-availability waiver)

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents including materials demonstrating compliance with Build America, Buy America provisions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Perform field welding in accordance with AWS D1.1/D1.1M.

D. Obtain approval prior to site cutting or making adjustments not scheduled.

E. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.2 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

C. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION

SECTION 061000 – ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Nonstructural dimension lumber framing.

C. Sheathing.

D. Roof-mounted curbs.

E. Roofing nailers.

F. Preservative treated wood materials.

G. Fire retardant treated wood materials.

H. Miscellaneous framing and sheathing.

I. Concealed wood blocking, nailers, and supports.

J. Miscellaneous wood nailers, furring, and grounds.

1.2 RELATED REQUIREMENTS

A. Section 033000 – Cast-in-Place Concrete: Setting anchors in concrete.

B. Section 061733 – Wood I-Joists.

C. Section 061753 – Shop-Fabricated Wood Trusses.

1.3 REFERENCE STANDARDS

A. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. AWC (WFCM) – Wood Frame Construction Manual for One- and Two-Family Dwellings; 2018, with Errata (2019).

C. AWPA U1 – Use Category System: User Specification for Treated Wood; 2023.

D. PS 1 – Structural Plywood; 2019.

E. PS 2 – Performance Standard for Wood Structural Panels; 2018.

F. PS 20 – American Softwood Lumber Standard; 2021.

G. WWPA G-5 – Western Lumber Grading Rules; 2021.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Douglas Fir-Larch, unless otherwise indicated.
2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Western Wood Products Association; WWPA G-5.

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.

2.3 EXPOSED TIMBERS

A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

B. Moisture Content: 19 percent maximum..

C. Surfacing: S4S.

D. Species: Douglas Fir.

E. Grade: No. 1.

2.4 STRUCTURAL COMPOSITE LUMBER

A. At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.

B. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

2.5 CONSTRUCTION PANELS

A. Roof Sheathing: PS 2 type, rated Structural I Sheathing.

1. Bond Classification: Exterior.
2. Span Rating: 32.
3. Performance Category: 5/8 PERF CAT.

B. Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I.

2.6 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. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

2.7 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.

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.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.3 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.

E. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.4 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 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.

C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.5 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.

1. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

3.6 TOLERANCES

A. Framing Members: 1/4 inch (6 mm) from true position, maximum.

B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

3.7 CLEANING

A. Waste Disposal: See Section 017419 – Construction Waste Management and Disposal.

1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 061500 – WOOD DECKING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Softwood lumber wood decking.

B. Preservative treatment of wood.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Bearing support.

1.3 REFERENCE STANDARDS

A. AITC 111 – Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection; 2005.

B. AWC WCD2 – Tongue and Groove Roof Decking; 2003.

C. WCLIB (GR) – Standard Grading Rules for West Coast Lumber No. 17; 2018.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide technical data on wood preservative materials.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect members in accordance with AITC 111 requirements for unwrapped material.

PART 2 - PRODUCTS

2.1 WOOD MATERIALS

A. Lumber Decking: Fabricated to AWC WCD2.

1. Species: Western Red Cedar, graded under WCLIB (GR) rules as AITC Select quality.
2. Size: 1 by 4 inches (25 x 200 mm), nominal.
3. Pattern: AITC standard beveled V-joint with single tongue and groove.
4. Moisture Content: 15 percent, maximum.

5. Finish: Rough sawn.

2.2 ACCESSORIES

A. Fasteners and Anchors:

1. Fastener Type and Finish: Hot-dipped galvanized steel for high humidity, exterior and preservative-treated wood locations, unfinished steel elsewhere.

2.3 WOOD TREATMENT

A. Preservative Pressure Treatment:

1. Basis of Design Product and Manufacturer: Permapost Products Company, Klear-Gard | 25.
2. Other Manufacturers:

a. Lonza Group: www.wolmanizedwood.com/#sle.
b. Osmose Utilities Services, Inc: www.osmose.com/#sle.
c. Viance, LLC: www.treatedwood.com/#sle.
d. Substitutions: See Section 016000 – Product Requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that support framing is ready to receive decking.

3.2 PREPARATION

A. Coordinate placement of support items.

3.3 INSTALLATION – BOARD DECKING

A. Install decking perpendicular to framing members, with ends staggered over firm bearing. On sloped surfaces, lay decking with tongue upward.

B. Fit butt end deck joints occurring between support members with metal splines to maintain tight, aligned joints.

C. Engage decking tongue and groove edges.

D. Secure with fasteners. Side spike planks together, through pre-drilled holes.

E. Maintain decking joint space of 1/16 inch (1.5 mm) maximum.

3.4 TOLERANCES

A. Surface Flatness of Decking Without Load: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/2 inch in 30 feet (12 mm / 9 m) maximum.

END OF SECTION

SECTION 061733 – WOOD I-JOISTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wood I-joists for roof framing.

B. Bridging, hangers, bracing, and anchorage.

C. Framing for openings.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Installation requirements for miscellaneous framing.

B. Section 061000 – Rough Carpentry: Material requirements for blocking, plates, and miscellaneous framing.

1.3 REFERENCE STANDARDS

A. ASTM D5055 – Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists; 2019, with Editorial Revision (2020).

B. PS 1 – Structural Plywood; 2019.

C. PS 2 – Performance Standard for Wood Structural Panels; 2018.

1.4 DESIGN REQUIREMENTS

A. Refer to structural notes in drawings for design loads and deflection limitations of I-joists at floor and roof.

B. Roof I-joists must have a minimum top and bottom chord size of 1.5 inch by 3.5 inch (5.29 square inches) to comply with fire rating requirements.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures, for submittal requirements.

B. Product Data: Manufacturer's literature describing materials, dimensions, allowable spans and spacings, bearing and anchor details, bridging and bracing requirements, and installation instructions; identify independent inspection agency.

C. Shop Drawings: Indicate sizes and spacing of joists, bracing and bridging, hangers, bearing stiffeners, holes to be cut (if any), and framed openings between joists.

1. Drawings and analysis to be sealed by a structural engineer registered in the state of Washington.

D. Certificate: Certification by joist manufacturer that products delivered are of the same design and construction as those evaluated by the independent inspection agency.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in manufacturer's original packaging with manufacturer's name and product identification intact and legible.

B. Protect products from damage due to weather and breakage.

C. Protect joists from warping or other distortion by stacking in upright position, braced to resist movement, with air circulation under coverings and around stacks.

D. Handle individual joists in the upright position.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wood I-Joists:

1. Boise Cascade Company: www.bc.com/#sle.
2. Louisiana-Pacific Corporation: www.lpcorp.com/#sle.
3. RedBuilt LLC; Redbuilt I-Joist: www.redbuilt.com//#sle.
4. Weyerhaeuser Company: www.weyerhaeuser.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

2.2 MATERIALS

A. Wood I-Joists: Solid lumber top and bottom flanges and oriented strand board (OSB) webs bonded together with structural adhesive, with published span rating to meet project requirements.

1. Span Rating: Established and monitored in accordance with ASTM D5055 by independent inspection agency.
2. Oriented Strand Board: Comply with PS 2.

3. Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.
4. Depth: As indicated on drawings.
5. Fabrication Tolerances:

    a. Flange Width: Plus/minus 1/32 inch (0.8 mm).
    b. Flange Thickness: Minus 1/16 inch (1.6 mm).
    c. Joist Depth: Plus 0, minus 1/8 inch (3.2 mm).

6. Marking: Mark each piece with depth, joist spacing, and allowable span for joist spacing.

B. Wood-Based Components:

1. Wood fabricated from old growth timber is not permitted.

C. Joist Hangers: Type and size recommended by joist manufacturer.

D. Joist Bridging: Type, size and spacing recommended by joist manufacturer.

E. Wood Blocking, Plates, and Miscellaneous Framing: As specified in Section 061000.

F. Fasteners: Electrogalvanized steel, type to suit application.

G. Bearing Plates: Electrogalvanized steel, unfinished.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that supports and openings are ready to receive joists.

B. Verify that field measurements are as indicated on shop drawings.

3.2 PREPARATION

A. Coordinate placement of bearing items.

3.3 ERECTION

A. Install joists in accordance with manufacturer's instructions.

B. Set structural members level and plumb, in correct position.

C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure plumb and in true alignment until completion of erection and installation of permanent bracing.

D. Do not field cut or alter structural members without approval of Architect.

E. Install permanent bridging and bracing.

F. Install headers and supports to frame openings required.

G. Frame openings between joists with lumber in accordance with Section 061000.

H. Coordinate installation of sheathing/decking with work of this section.

3.4 TOLERANCES

A. Framing Members: 1/2 inch (12 mm) maximum, from true position.

END OF SECTION

SECTION 061753 – SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Shop-fabricated wood trusses.

B. Truss bridging.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Installation requirements for miscellaneous framing.

B. Section 061000 – Rough Carpentry: Material requirements for blocking, bridging, plates, and miscellaneous framing.

1.3 REFERENCE STANDARDS

A. ANSI/TPI 1 – National Design Standard for Metal-Plate-Connected Wood Truss Construction; 2014.

B. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. SBCA (BCSI) – Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses; 2018 (Updated 2020).

D. TPI DSB-89 – Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses; 1989.

E. WCLIB (GR) – Standard Grading Rules for West Coast Lumber No. 17; 2018.

F. WWPA G-5 – Western Lumber Grading Rules; 2021.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Shop Drawings: Show truss configurations, sizes, spacing, size and type of plate connectors, cambers, framed openings, bearing and anchor details, and bridging and bracing.

1. Include identification of engineering software used for design.
2. Provide shop drawings stamped or sealed by an engineer qualified to work in the state of Washington.

3. Submit design calculations stamped by an engineer qualified to work in the state of Washington.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: Perform design by or under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State in which the Project is located.

B. Fabricator Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handle trusses in accordance with SBCA (BCSI).

B. Store trusses in vertical position resting on bearing ends.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Truss Plate Connectors:

1. Alpine, an ITW Company: www.alpineitw.com/#sle.
2. MiTek Industries, Inc: www.mii.com/#sle.
3. Substitutions: See Section 016000 – Product Requirements.

2.2 TRUSSES

A. Wood Trusses: Design and fabricate trusses in accordance with ANSI/TPI 1 and to achieve specified design requirements indicated.

1. Design and fabricate temporary bracing in accordance with TPI DSB-89.
2. Species and Grade: Douglas Fir, WWPA G-5 Grade.
3. Connectors: Steel plate.

2.3 MATERIALS

A. Lumber:

1. Moisture Content: Between 7 and 9 percent.
2. Lumber fabricated from old growth timber is not permitted.

B. Steel Connectors: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) Grade 33/230, with G90/Z275 coating; die stamped with integral teeth; thickness as indicated.

C. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that supports and openings are ready to receive trusses.

3.2 ERECTION

A. Install trusses in accordance with manufacturer's instructions, SBCA (BCSI); maintain a copy of applicable documents on site until installation is complete.

B. Set members level and plumb, in correct position.

C. Install permanent bridging and bracing.

3.3 TOLERANCES

A. Framing Members: 1/2 inch (12 mm) maximum, from true position.

END OF SECTION

SECTION 061800 – GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Glue laminated wood beams and purlins.

B. Preservative treatment of wood.

1.2 REFERENCE STANDARDS

A. AITC 117 – Standard Specifications for Structural Glued Laminated Timber of Softwood Species; 2010.

B. AITC A190.1 – American National Standard for Wood Products – Structural Glued Laminated Timber; 2007.

C. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

D. ASTM D2559 – Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions; 2012a (Reapproved 2018).

E. AWPA U1 – Use Category System: User Specification for Treated Wood; 2023.

1.3 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide technical data on wood preservative materials, application technique and resultant performance information.

C. Shop Drawings: Indicate framing system, sizes and spacing of members, loads and cambers, bearing and anchor details, bridging and bracing, framed openings .

D. Manufacturer's Qualification Statement.

1.4 QUALITY ASSURANCE

A. Manufacturer/Fabricator Qualifications: Company specializing in manufacture of glue laminated structural units with three years of documented experience, and certified by AITC in accordance with AITC A190.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect members to AITC requirements for not wrapped.

B. Leave individual wrapping in place until finishing occurs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Glued-Laminated Structural Units:

1. Sentinel Structures, Inc: www.sentinelstructures.com/#sle.
2. Western Wood Structures, Inc: www.westernwoodstructures.com/#sle.
3. Substitutions: See Section 016000 – Product Requirements.

2.2 GLUED-LAMINATED UNITS

A. Glued-Laminated Units: Fabricate in accordance with AITC 117 Industrial grade.

1. Verify dimensions and site conditions prior to fabrication.
2. Cut and fit members accurately to length to achieve tight joint fit.
3. Fabricate member with camber built in.
4. Do not splice or join members in locations other than those indicated without permission.
5. After end trimming, seal with penetrating sealer in accordance with AITC requirements.

2.3 MATERIALS

A. Laminating Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.

2.4 WOOD TREATMENT

A. Factory-Treated Lumber: Comply with requirements of AWPA U1 – Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.

B. Preservative Pressure Treatment:

1. Manufacturers:

a. Permapost Hi-Clear II: www.permapost.com.
b. Substitutions: See Section 016000 – Product Requirements.

2. Preservative Pressure Treatment of Glued-Laminated Structural Units: AWPA U1, Use Category UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention (to 4.0 kg/cu m retention).

a. Kiln dry lumber after treatment and before lamination to maximum moisture content of 19 percent.

2.5 FABRICATION

A. Fabricate glue laminated structural members in accordance with AITC Architectural grade.

B. Verify dimensions and site conditions prior to fabrication.

C. Cut and fit members accurately to length to achieve tight joint fit.

D. Fabricate member with camber built in.

E. Do not splice or join members in locations other than those indicated without permission.

F. After end trimming, seal with penetrating sealer in accordance with AITC requirements.

PART 3 - EXECUTION

3.1 ERECTION

A. Lift members using protective straps to prevent visible damage.

B. Set structural members level and plumb, in correct positions or sloped where indicated.

C. Provide temporary bracing and anchorage to hold members in place until permanently secured.

D. Fit members together accurately without trimming, cutting, splicing, or other unauthorized modification.

3.2 TOLERANCES

A. Framing Members: 1/2 inch (12 mm) maximum from true position.

END OF SECTION

SECTION 062000 – FINISH CARPENTRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wood door trim

B. Wood window casings and trim.

C. Wood base.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 081416 – Flush Wood Doors.

C. Section 099000 – Painting and Coating: Staining and transparent finishing of finish carpentry items.

D. Section 123200 – Manufactured Wood Casework: Shop fabricated cabinet work.

1.3 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) – Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) – North American Architectural Woodwork Standards; 2021, with Errata.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data:

1. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
2. Samples: Submit two samples of each wood trim 6" inch (152 mm) long.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-fabricated units to project site in original packages, containers or bundles bearing brand name and identification.

B. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.

C. Protect from moisture damage.

D. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 - PRODUCTS

2.1 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Interior Woodwork Items:

1. Bases, Casings, and Miscellaneous Trim: 1 x solid Hem-Fir. No finger jointed material allowed.
2. See Drawings for others, sizes and profiles.

2.2 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Fasteners: Concealed of size and type to suit application.

2.3 ACCESSORIES

A. Lumber for Shimming and Blocking: Softwood lumber of fir species.

B. Wood Filler: Solvent base, tinted to match surface finish color.

2.4 SITE FINISHING MATERIALS

A. Field Finishing: See Section 099000.

2.5 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.2 INSTALLATION

A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Install factory-fabricated units in accordance with manufacturer's printed installation instructions.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

E. Install trim with finish nails.

3.3 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.4 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch (1.6 mm).

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

END OF SECTION

SECTION 066300 – PLASTIC RAILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior porch railings and guardrails.

1.2 RELATED REQUIREMENTS

A. Section 033000 – Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 061000 – Rough Carpentry: PT members and supports for railing system.

1.3 REFERENCE STANDARDS

A. ADA Standards – 2010 ADA Standards for Accessible Design; 2010.

B. ASTM D7032 – Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails; 2021.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

C. Samples: Submit two, 6 inch (152.4 mm) long samples of handrail. Submit two samples of top rail, bottom rail and pickets.

D. Manufacturer's Qualification Statement.

E. Manufacturer's Instructions.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least five years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Comply with manufacturer's recommendations. Handle materials to avoid damage.

1.7 WARRANTY

A. See Section 017700 – Closeout Procedures, for additional warranty requirements.

B. Railing Warranty: Provide manufacturer's standard 10 year warranty.

C. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Wood-Plastic Composite Post Sleeves and Railings:

1. Azek Building Products, Inc: www.azek.com/#sle.
2. CertainTeed, Inc: www.certainteed.com/#sle.
3. Trex Company: www.trex.com/#sle

2.2 WOOD -PLASTIC COMPOSITE GUARDRAIL SYSTEMS

A. Basis of Design Product and Manufacturer: Transcend Railing system by the Trex Company.

B. Performance Requirements:

1. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 125 pounds per linear foot (1825 N/m) applied to the top of the assembly and in any direction, without damage or permanent set, when tested in accordance with ASTM D7032.
2. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds (890 N) applied at any point on the top of the assembly and in any direction, without damage or permanent set, when tested in accordance with ASTM D7032.

C. Material Properties:

1. Thermal Expansion: ASTM D 1037 1.9 x 10^{-5} inch/inch/degree F.
2. Moisture Absorption: ASTM D 1037 < 1%.
3. Fungus Resistance: ASTM D1413 Rating – no decay
4. Termite Resistance: AWPAE1-72 Rating = 9.6

D. Design Requirements:

1. Allow for expansion and contraction of members and building movement without damage to connections or members.
2. Dimensions: See drawings.

3. Provide anchors and other components as required to attach to structure; where exposed fasteners are unavoidable provide flush countersunk fasteners.

    a. Provide inserts to be cast into concrete, for bolting anchors. See Section 033000.

E. Wood-Plastic Composite Rails:

1. Top Rail: Composite crown top support rail.

    a. Basis of Design Product and Manufacturer: Transcend Railing Crown Top Rail by the Trex Company

2. Bottom Rail: Composite standard bottom support rail.

    a. Basis of Design Product and Manufacturer: Transcend Railing Universal Bottom Rail by the Trex Company.

F. Wood-Plastic Composite Newel Posts: Provide post mounts and caps required for the installation.

1. Post Size: 4 by 4 inch (100 by 100 mm).

    a. Basis of Design Product and Manufacturer: Transcend Railing 4" Post Sleeve by the Trex Company.

2. Post Cap Style: Flat.

    a. Basis of Design Product and Manufacturer: Transcend Railing Flat Post Sleeve Cap by the Trex Company.

G. Railing Infill:

1. Baluster:

    a. Material: Composite.
    b. Profile: 1-3/8 inch + square.

H. Texture: Smooth, matte.

I. Color: Black.

J. Exposed Fasteners: No exposed bolts or screws.

2.3 MATERIALS

A. Wood-Plastic Composite Railing Components: Recycle Linear Low Density Polyethylene molded into hollow shapes in standard railing sizes and profiles.

2.4 ACCESSORIES

A. Fasteners and Anchors:

1. Fasteners: Stainless steel, trim head.
2. Screws: Bugle head, hardened steel, power driven type, length to achieve full penetration of decking substrate approved by the manufacturer.
3. Other Components: Manufacturer recommended and provided to provide a complete railing system meeting the Performance and Design requirements above.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that railing locations and substrates are ready to receive work.

3.2 PREPARATION

A. Provide items cast into concrete with setting templates.

3.3 INSTALLATION

A. Install according to manufacturer's written instructions, and applicable ICC-ES report.

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. Conceal anchor bolts and screws.

3.4 CLEANING

A. See Section 017419 – Construction Waste Management and Disposal, for additional requirements.

B. Clean surfaces according to manufacturer's written instructions.

3.5 PROTECTION

A. Protect installed work from subsequent construction operations. Repair damaged surfaces. Remove and replace work which cannot be repaired.

END OF SECTION

SECTION 071900 – WATER REPELLENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water repellents applied to exterior, masonry and concrete surfaces.

1.2 REFERENCE STANDARDS

A. ASTM C140/C140M – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2023.

B. ASTM C642 – Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2021.

C. ASTM D3960 – Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2018).

D. ASTM D5095 – Standard Test Method for Determination of the Nonvolatile Content in Silanes, Siloxanes and Silane-Siloxane Blends Used in Masonry Water Repellent Treatments; 1991 (Reapproved 2022).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a meeting at least one week prior to starting work; require attendance of affected installers; invite Owner.

1.4 SUBMITTALS

A. See Section 013300 – Submit Procedures for submittal requirements.

B. Product Data: Provide product description, details of tests performed, limitations, and chemical composition.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Field Reports: Report whether manufacturer's "best practices" are being followed; if not, state corrective recommendations. Email report to Owner the same day as inspection occurs; mail report on manufacturer's letterhead to Owner within 2 days after inspection.

F. Manufacturer's Qualification Statement.

G. Installer's Qualification Statement.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Water Repellent Material: Two gallons (9 liters) of type installed.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five 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.

1.6 MOCK-UPS

A. Prepare representative surface 36 by 36 inches (0.91 by 0.91 m) in size using specified materials and preparation and application methods on surfaces identical to those to be coated; approved mock-up constitutes standard for workmanship.

B. For proposed substitutions, prepare side-by-side mock-ups of specified and substitute products.

C. Mock-up may remain as part of work.

1.7 FIELD CONDITIONS

A. Protect liquid materials from freezing.

B. Do not apply water repellent when ambient temperature is lower than 50 degrees F (10 degrees C) or higher than 100 degrees F (38 degrees C).

C. Do not apply water repellents when wind velocity is higher than 15 mph (24.14 kph).

1.8 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

B. Provide five year manufacturer warranty for sealer.

1. Include coverage for degradation of waterproofing ability on designated substrate.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Silane, Siloxane, Silane-Siloxane Blend, and Siliconate Water Repellents:

1. Evonik Corporation; Protectosil CHEM-TRETE BSM 400: www.evonik.com/#sle.
2. Pecora Corporation; KlereSeal 940-S VOC Silane Penetrating Sealer: www.pecora.com/#sle.
3. Substitutions: See Section 016000 – Product Requirements.

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. Number of Coats: Two.
3. VOC Content: Less than 600 g/L, when tested in accordance with ASTM D3960 or ASTM D5095.
4. Moisture Absorption When Applied to Masonry: Five percent, maximum, when tested in accordance with ASTM C140/C140M using masonry sample completely coated with water repellent.
5. Moisture Absorption When Applied to Concrete: Five percent, maximum, when tested in accordance with ASTM C642 concrete sample completely coated with water repellent.
6. Maintains dry appearance when wetted.

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. Apply at rate recommended by manufacturer, continuously over entire surface.

C. Apply two coats, minimum.

D. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

E. Provide manufacturer's field service representative to inspect preparation and application work continuously during entire application period to ensure that manufacturer's "best practices" for preparation and application are being followed.

END OF SECTION

SECTION 072100 – THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Board insulation at perimeter foundation wall, underside of floor slabs, and exterior wall as shown on drawings.

B. Batt insulation and vapor retarder in exterior wall, ceiling, roof, and floor construction.

C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.2 RELATED REQUIREMENTS

1.3 REFERENCE STANDARDS

A. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

B. ASTM C665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.

C. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

D. ASTM E136 – Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C; 2022.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

F. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on project site during and after installation. Present on-site documentation upon request.

1.5 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:

1. Installer Qualification: Use accredited contractors, certified installers, evaluated materials, and third-party field quality control audit.
2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.6 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 - PRODUCTS

2.1 APPLICATIONS

A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.

B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

C. Insulation on Inside of Concrete and Masonry Exterior Walls: Extruded polystyrene (XPS) board.

D. Insulation in Wood Framed Walls: Batt insulation with separate vapor retarder.

E. Insulation in Wood Framed Ceiling and Floor Structures: Batt insulation with separate vapor retarder.

2.2 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene (XPS) Board Insulation: Comply 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 (RSI-value): Type IV, 5.0 (0.88), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.

5. Board Edges: Square.
6. Type and Water Absorption: Type XII, 0.3 percent by volume, maximum, by total immersion.
7. Products:

    a. DuPont de Nemours, Inc; Styrofoam Brand Scoreboard: building.dupont.com/#sle.
    b. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: www.kingspan.com/#sle.
    c. Owens Corning Corporation; FOAMULAR Type IV Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
    d. Substitutions: See Section 016000 – Product Requirements.

2.3 MINERAL FIBER BLANKET INSULATION MATERIALS

A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, 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. Formaldehyde Content: Zero.
5. Manufacturers:

    a. CertainTeed Corporation: www.certainteed.com/#sle.
    b. Johns Manville: www.jm.com/#sle.
    c. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
    d. Knauf Insulation. https://www.knaufnorthamerica.com/en-us/#sle
    e. Substitutions: See Section 016000 – Product Requirements.

2.4 ACCESSORIES

A. Interior Vapor Retarder: polyamide film, 2 mil, 0.006 inch (0.05 mm) thick.

1. Widths: 8, 9, 10 and 12 feet.
2. Products:

    a. Certainteed, MemBrain Continuous Air Barrier & Smart Vapor Retarder: www.certainteed.com/building-insulation/products/membrain.
    b. Substitutions: See Section 016000 – Product Requirements.

B. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.

1. Application: Sealing of interior circular penetrations, such as pipes or cables.
2. Width: Are required for application.
3. Temperature Resistance: Range of minus 40 to 212 degrees F (minus 40 to 100 degrees C).

C. Flashing Tape: Special reinforced film with high performance adhesive.

1. Application: Window and door opening flashing tape.
2. Width: As required for application.
3. Primer: Tape manufacturer's recommended product.

D. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.

1. Width: 5-1/2 inches (140 mm).
2. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.
3. Products:

a. Protecto Wrap Company; Triple Guard Energy Sill Sealer: www.protectowrap.com/#sle.

E. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.

F. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

G. Protection Board for Below Grade Insulation: Cementitious, 1/4 inch (6 mm) thick.

H. 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.

3.2 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install boards horizontally on foundation perimeter.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Immediately following application of board insulation, place protective boards over exposed insulation surfaces.

1. Apply adhesive in five continuous beads per board length.
2. Install boards horizontally from base of foundation to top of insulation.
3. Butt boards tightly, with joints staggered from insulation joints.

3.3 BOARD INSTALLATION AT EXTERIOR WALLS

A. Install boards vertically on walls.

1. Place boards to maximize adhesive contact.
2. Install in running bond pattern.
3. Butt edges and ends tightly to adjacent boards and protrusions.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Tape insulation board joints.

3.4 BOARD INSTALLATION UNDER CONCRETE SLABS

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.5 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches (152 mm) on center. Lap and seal sheet retarder joints over face of member.

F. Tape seal tears or cuts in vapor retarder.

G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

3.6 FIELD QUALITY CONTROL

A. See Section 014000 – Quality Requirements for additional requirements.

3.7 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 072500 – WEATHER BARRIERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water-resistive barriers.

1.2 RELATED REQUIREMENTS

A. Section 076200 – Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

1.3 DEFINITIONS

A. Weather Barriers: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.

B. Water-Resistive Barrier: A material behind an exterior wall covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly.

1.4 REFERENCE STANDARDS

A. AATCC Test Method 127 – Test Method for Water Resistance: Hydrostatic Pressure; 2018, with Editorial Revision (2019).

B. ASTM D1970/D1970M – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.

C. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

D. ASTM E96/E96M – Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).

E. ASTM E2178 – Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide data on material characteristics.

C. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.6 MOCK-UPS

A. See Section 014000 – Quality Requirements for additional requirements.

B. Construct weather barrier mock-up, 20 feet (6.096 m) long by 20 feet (6.096 m) wide, indicating door and window opening conditions.

C. Mock-up may not remain as part of work.

1.7 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER MATERIALS

A. Drainable Water-Resistive and Air Barrier: Nonwoven, spunbonded polypropylene.

1. Air Permeance: 0.0011 cfm/sq ft (0.0058 L/(s sq m)), maximum, when tested in accordance with ASTM E2178.
2. Water Vapor Permeance: 54 perms (3,078 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M using Procedure A – Desiccant Method, at 73.4 degrees F (23 degrees C).
3. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 3 months of weather exposure.
4. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
5. Drainability: Vertically grooved surface to help channel water safely to the outside without the need for installation of a rainscreen batten system.
6. Seam and Perimeter Tape: As recommended by sheet manufacturer.
7. Products:

    a. Basis of Design Product: DuPont de Nemours, Inc.; Tyvek DrainWrap.
    b. Substitutions: See Section 016000 – Product Requirements.

2.2 ACCESSORIES

A. Sealants, Tapes, and Accessories Used for Sealing Water-Resistive Barrier and Adjacent Substrates: As indicated or complying with water-resistive barrier manufacturer's installation instructions.

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. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 30 days of weather exposure.
2. Products:

a. Basis of Design Opening Sill Wrap: DuPont de Nemours, Inc; FlexWrap: www.dupont.com/building/#sle.
b. Basis of Design Opening Head and Jamb Wrap: DuPont de Nemours, Inc; VersaFlange: www.dupont.com/building/#sle.
c. Protecto Wrap; Protector Seal 45: protectowrap.com/product/protecto-seal-45.
d. Protecto Wrap; Protector Seal 45 Butyl: protectowrap.com/product/protecto-seal-45-butyl/.
e. Henry Company; FortiFlex Butyl: www.henry.com/#sle.
f. Henry Company; FortiFlash Butyl: www.henry.com/#sle.
g. Substitutions: See Section 016000 – Product Requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and conditions comply with requirements 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 and sealants in accordance with manufacturer's installation instructions.

3.3 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Water-Resistive Barriers: Install continuous water-resistive barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.

D. Mechanically Fastened Exterior Sheets:

1. Install sheets shingle-fashion to shed water, with seams aligned horizontal.
2. Overlap seams as recommended by manufacturer, 6 inches (152 mm), minimum.

3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches (305 mm), minimum.
4. Attach to framed construction with fasteners extending through sheathing into framing, and space fasteners at 12 to 18 inches (305 to 460 mm) on center along each framing member supporting sheathing.
5. For applications indicated to be airtight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners as recommended by manufacturer.
6. Where stud framing rests on concrete or masonry substrate, extend lower edge of barrier sheets at least 4 inches (102 mm) below bottom of framing and seal to substrate with sealant or approved mounting tape.
7. Install water-resistive barrier over jamb flashings.
8. Install head flashings under water-resistive barrier.
9. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.

E. Openings and Penetrations in Exterior Water-Resistive Barriers:

1. Install flashing over sills, covering entire sill framing member, and extend at least 5 inches (127 mm) onto water-resistive barrier and at least 6 inches (152 mm) up jambs; mechanically fasten stretched edges.
2. At openings 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 (100 mm) wide; do not seal sill flange.
3. At openings filled with nonflanged frames, seal water-resistive barrier to each side of framing at opening using flashing at least 9 inches (230 mm) wide, and covering entire depth of framing.
4. At head of openings, install flashing under water-resistive barrier extending at least 2 inches (50 mm) beyond face of jambs; seal water-resistive barrier to flashing.
5. At interior face of openings, seal gaps between window and door frames and rough framing using appropriate joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating items and seal to surface of water-resistive barrier.

3.4 FIELD QUALITY CONTROL

A. See Section 014000 – Quality Requirements for additional requirements.

B. Do not cover installed water-resistive barriers until required inspections have been completed.

C. Obtain approval of installation procedures from water-resistive barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

D. Take digital photographs of each portion of installation prior to covering up weather barriers.

3.5 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 074113 – METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal roof panel system of preformed steel panels.

1.2 RELATED REQUIREMENTS

A. Section 079200 – Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

1.3 REFERENCE STANDARDS

A. AAMA 2605 – Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASTM A792/A792M – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2022.

C. ASTM D1970/D1970M – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.

D. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

E. ASTM E1592 – Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2017).

F. ASTM E1646 – Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995 (Reapproved 2018).

G. ASTM E1680 – Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems; 2016 (Reapproved 2022).

H. UL 580 – Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Summary of test results, indicating compliance with specified requirements.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.

1. Show work to be field-fabricated or field-assembled.
2. Include structural analysis signed and sealed by qualified structural engineer, indicating compliance of roofing system to specified loading conditions.

D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches (305 mm) square, representing actual roofing metal, thickness, profile, color, and texture.

1. Include typical panel joint in sample.
2. Include typical fastening detail.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Test Reports: Indicate compliance of metal roofing system to specified requirements.

I. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least seven 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.

1.6 MOCK-UPS

A. See Section 014000 – Quality Requirements for additional requirements.

B. Provide mock-up of 40 sq ft (12.19 sq m), including underlayment and associated flashings.

C. Mock-up may remain as part of the work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.8 FIELD CONDITIONS

A. Do not install metal roof panels, underlayment when surface, ambient air, or wind chill temperatures are below 45 degrees F (7 degrees C).

1.9 WARRANTY

A. Finish Warranty: Provide 20-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

B. Special Warranty: Provide 5-year warranty for weathertightness of roofing system, including agreement to repair or replace metal roof panels that fail to keep out water commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Metal Roof/Wall Panels: SpanSeam standing seam roof by AEP Span; https://www.aepspan.com/#sle

B. Architectural Metal Roof Panel Manufacturers:

1. Metal Roofing Systems, Inc: www.metalroofingsystems.biz/#sle.
2. Metl-Span, a Division of NCI Group, Inc: www.metlspan.com/#sle.
3. AEP Span: www.aepspan.com/products/#sle.
4. Taylor Metal Products: https://taylormetal.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:

1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.

a. Dead Loads: Weight of roofing system.
b. Live Loads: As indicated on drawings.

2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
3. Wind Uplift: Class 90 wind uplift resistance of UL 580.
4. Air Infiltration: Maximum 0.06 cfm/sq ft (1.1 cu m/hr/sq m) at air pressure differential of 6.24 lbf/sq ft (300 Pa), when tested according to ASTM E1680.
5. Water Penetration: No water penetration when tested in accordance with procedures and recommended test pressures of ASTM E1646; perform test immediately following air infiltration test.
6. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F (56 degrees C).

2.3 METAL ROOF PANELS

A. Metal Roof Panels: 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. Aluminum-zinc alloy-coated steel complying with ASTM A792/A792M; minimum AZ50 (AZM150) coating.
b. Steel Thickness: Minimum 22 gauge, 0.030 inch (0.76 mm).

2. Profile: Standing seam, with minimum 1.0 inch (25 mm) seam height; concealed fastener system for field seaming with special tool.
3. Texture: Smooth.
4. Length: Full length of roof slope, without lapped horizontal joints.
5. Width: Maximum panel coverage of 16 inches (406 mm).
6. Color: To match AEP Span Zincalume Plus.

2.4 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.5 FABRICATION

A. Panels: Provide factory fabricated panels with applied 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.

2.6 FINISHES

A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm); color and gloss as noted above.

2.7 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, and caps 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:

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. Thermal Insulation: Provide rigid type, faced with white, flexible, non-dusting vapor retarder tested for maximum flame spread index of 50, per ASTM E84; for installation using spacer blocks.

1. Thickness: As indicated.

E. Underlayment: Self-adhering polymer modified asphalt sheet complying with ASTM D1970/D1970M, with strippable release film and top surface of woven polypropylene sheet.

1. Sheet Thickness: 22 mil, 0.022 inch (0.55 mm) minimum total thickness.
2. Self Sealability: Nail sealability in accordance with ASTM D1970/D1970M.
3. Products:

a. Certainteed Roofing; WinterGuard HT – High Temperature Waterproofing Underlayment: www.certainteed.com/#sle.
b. Henry Company; Blueskin PE200HT: www.henry.com/#sle.
c. Polyglass USA, Inc; Polystick MTS Self-Adhered High Temperature Roof Underlayment: www.polyglass.us/#sle.
d. Substitutions: See Section 016000 – Product Requirements.

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. Broom clean wood sheathing prior to installation of roofing system.

B. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to ensure that completed roof will be free of leaks.

C. Coordinate installation of waterproof membrane over roof sheathing with Section 061000.

D. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.

E. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.

F. Protect surrounding areas and adjacent surfaces from damage during execution of this work.

G. At locations 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. Overall: Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place allowing for thermal and structural movement.

1. Install roofing system with concealed clips and fasteners.
2. Minimize field cutting of panels. Where field cutting is required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.

B. Accessories: Install necessary components that are required for complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, rib closures, and similar roof accessory items.

C. Install roofing underlayment and slip sheet on roof sheathing before installing preformed metal roof panels; secure by methods acceptable to roof panel manufacturer, minimizing use of metal

fasteners; apply from eaves to ridge in shingle fashion, overlapping horizontal joints at least 2 inches (50 mm) and side and end laps at least 3 inches (75 mm); offset seams in underlayment.

D. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.

1. Provide concealed clips at panel joints.

E. Insulation: Install insulation between roof covering and supporting members to present a neat appearance; fold, staple, and tape seams unless otherwise approved by Architect.

3.4 CLEANING

A. See Section 017700 – Closeout Procedures for additional requirements.

B. 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 074213 – METAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manufactured metal panels for exterior wall panels, with related flashings and accessory components.

1.2 RELATED REQUIREMENTS

A. Section 072500 – Weather Barriers: Weather barrier under wall panels.

B. Section 079200 – Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

1.3 REFERENCE STANDARDS

A. AAMA 2605 – Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASTM A792/A792M – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2022.

C. NFPA 285 – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data – Wall System: Manufacturer's data sheets on each product to be used, including:

1. Physical characteristics of components shown on shop drawings.
2. Storage and handling requirements and recommendations.
3. Installation instructions and recommendations.

C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and methods of anchorage.

D. Samples: Submit two samples of each wall panel, 12 inches by 12 inches (305 mm by 305 mm) in size illustrating finish color, sheen, and texture.

E. Test Reports: Submit test report verifying compliance with NFPA 285 for previously-tested exterior wall assembly.

F. Installer's qualification statement.

G. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing products specified in this section with minimum three years of documented experience.

1.6 MOCK-UPS

A. See Section 014000 – Quality Requirements for additional requirements.

B. Construct mock-up, 10 feet (3.1 m) long by 2 feet (0.6 m) wide; include panel system, attachments to building frame, associated vapor retarder and air seal materials, weep drainage system, sealants and seals, and related insulation in mock-up.

C. Mock-up may remain as part of work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet 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 or staining of products.

1.8 WARRANTY

A. Finish Warranty: Provide 5-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

B. Special Warranty: Provide 2-year warranty covering water tightness and integrity of seals of metal wall panels. Complete forms in Owner's name and register with warrantor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Metal Wall Panels – Concealed Fasteners:

1. McElroy Metal: www.mcelroymetal.com/#sle.

2. Metal Roofing Systems, Inc: www.metalroofingsystems.biz/#sle.
3. AEP Span: www.aepspan.com/#sle.
4. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

2.2 METAL WALL PANEL SYSTEM

A. Basis of Design Product and Manufacturer: Flex Series 1.2FX40-12 by AEP Span.

B. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.

1. Provide exterior wall panels.
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. Maximum Allowable Deflection of Panel: L/180 for length(L) of span.
4. 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.
5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
7. Corners: Factory-fabricated in one continuous piece with minimum 2-inch (51 mm) returns.

C. Exterior Wall Panels:

1. Profile: Vertical; style as indicated.
2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
3. Material: Precoated steel sheet, 22 gauge, 0.0299 inch (0.76 mm) minimum thickness.
4. Panel Width: 12 inches (305 mm).
5. Color: Match AEP Span Slate Gray.

D. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

E. Expansion Joints: Same material, thickness and finish as exterior sheets; 22 gauge, 0.0299 inch (0.76 mm) thick; manufacturer's standard brake formed type, of 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. Precoated Steel Sheet: Aluminum-zinc alloy-coated steel sheet, ASTM A792/A792M, Commercial Steel (CS)) or Forming Steel (FS), with AZ50/AZM150 coating; continuous-coil-

coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

B. Select materials with surface flatness, smoothness, and lack of surface blemishes where exposed to view in finished system.

2.4 FINISHES

A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm); color and gloss as noted above.

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, see Section 079200

C. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.

D. Fasteners: Manufacturer's standard type to suit application; steel, hot dip galvanized.

E. Field Touch-up Paint: As recommended by panel manufacturer.

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 water-resistive barrier has been installed over substrate completely and correctly.

3.2 INSTALLATION

A. Install panels on walls 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 wall panel installation.

C. Fasten panels to structural supports; aligned, level, and plumb.

D. Locate joints over supports.

E. Provide expansion and control joints where indicated.

F. Use concealed fasteners unless otherwise indicated by Architect.

G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.3 TOLERANCES

A. Offset From True Alignment Between Adjacent Members Abutting or In Line: 1/16 inch (1.6 mm), maximum.

B. Variation from Plane or Location As Indicated on Drawings: 1/4 inch (6.4 mm), maximum.

3.4 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

SECTION 074646 – FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fiber-cement siding.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Siding substrate.

B. Section 072500 – Weather Barriers: Water-resistive barrier under siding.

C. Section 079200 – Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

D. Section 09 90 00 – Painting and Coating: Field painting.

1.3 REFERENCE STANDARDS

A. ASTM C1186 – Standard Specification for Flat Fiber-Cement Sheets; 2022.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Submit manufacturer's data sheets on each product to be used, including:

1. Manufacturer's requirements for related materials to be installed by others.
2. Preparation instructions and recommendations.
3. Storage and handling requirements and recommendations.
4. Installation methods, including nail patterns.

C. Installer's qualification statement.

D. Warranty: Submit copy of manufacturer’s warranty, made out in Owner’s name, showing that it has been registered with manufacturer.

E. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of type specified in this section with not less than three years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store materials in manufacturer's unopened packaging, with labels intact, until ready for installation.

B. Store materials under dry and waterproof cover, well ventilated, and elevated above grade on a flat surface.

1.7 WARRANTY

A. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

B. Manufacturer Warranty: Provide manufacturer warranty for years as indicated under Fiber-Cement Siding article sub-headings for "Warranty". Complete forms in Owner's name and register with manufacturer.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.

1. Style: Standard lap style.
2. Texture: Simulated cedar grain.
3. Length: 12 feet (3.7 m), nominal.
4. Width (Height): Widths vary, see Drawings.
5. Thickness: 5/16 inch (8 mm), nominal.
6. Finish: Factory applied primer.
7. Warranty: 50 year limited; transferable.
8. Products:

    a. Allura, a division of Plycem USA, Inc: www.allurausa.com/#sle.
    b. James Hardie Building Products, Inc: www.jameshardie.com/#sle.
    c. Nichiha USA, Inc: www.nichiha.com/#sle.
    d. Substitutions: See Section 016000 – Product Requirements.

B. Panel Siding: Vertically oriented panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.

1. Texture: Smooth.
2. Length (Height): 96 inches (2400 mm), or longer as required.
3. Width: 48 inches (1220 mm).
4. Thickness: 5/16 inch (8 mm), nominal.
5. Finish: Factory applied primer.
6. Warranty: 50 year limited; transferable.
7. Products:

    a. Allura, a division of Plycem USA, Inc: www.allurausa.com/#sle.
    b. James Hardie Building Products, Inc: www.jameshardie.com/#sle.
    c. Nichiha USA, Inc: www.nichiha.com/#sle.
    d. Substitutions: See Section 016000 – Product Requirements.

2.2 ACCESSORIES

A. Trim: Same material and texture as lap siding.

B. Fasteners: Galvanized or corrosion resistant; length as required to penetrate, 1-1/4 inches (31.8 mm), minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.

B. Verify that water-resistant barrier has been installed over substrate completely and correctly; see Section 072500.

C. Do not begin until unacceptable conditions have been corrected.

D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Protect surrounding areas and adjacent surfaces during execution of this work.

B. Install Sheet Metal Flashing:

1. Above door and window trim and casings.
2. Above horizontal trim in field of siding.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions and recommendations.

1. Read warranty and comply with terms necessary to maintain warranty coverage.
2. Use trim details as indicated on drawings.
3. Touch up field cut edges before installing.
4. Pre-drill nail holes if necessary to prevent breakage.

B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.

C. Allow space for thermal movement between both ends of siding panels that butt against trim; seal joint between panel and trim with specified sealant.

D. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.

E. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.

F. Do not install siding less than 6 inches (152 mm) from ground surface, or closer than 1 inch (25.4 mm) to roofs, patios, porches, and other surfaces where water may collect.

G. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.

3.4 CLEANING

A. See Section 017700 – Closeout Procedures for additional requirements.

B. Clean faced panels in accordance with manufacturer's maintenance instructions, using cleaning materials and methods acceptable to manufacturer.

3.5 PROTECTION

A. Protect installed products until Date of Substantial Completion.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 076200 – SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, exterior penetrations, and other items indicated in Schedule.

B. Sealants for joints within sheet metal fabrications.

C. Precast concrete splash pads.

1.2 RELATED REQUIREMENTS

1.3 REFERENCE STANDARDS

A. AAMA 2605 – Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM A666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM B32 – Standard Specification for Solder Metal; 2020.

E. ASTM C920 – Standard Specification for Elastomeric Joint Sealants; 2018.

F. ASTM D2178/D2178M – Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a (Reapproved 2021).

G. ASTM D4586/D4586M – Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).

H. CDA A4050 – Copper in Architecture – Handbook; current edition.

I. SMACNA (ASMM) – Architectural Sheet Metal Manual; 2012.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Samples: Submit two samples 6 by 6 inch (153 by 153 mm) in size illustrating metal finish color.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Maintain one copy of each document on site.

C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with three years of documented experience.

1.7 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 MANUFACTURERS

A. Sheet Metal Flashing and Trim:

1. Fairview Architectural LLC: www.fairview-na.com/#sle.
2. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
3. Tamlyn: www.tamlyn.com/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

B. Exterior Penetration Flashing Panel:

1. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.
2. Substitutions: See Section 016000 – Product Requirements.

2.2 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch (0.61 mm) thick base metal.

B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch (0.61 mm) thick base metal, shop pre-coated with PVDF coating.

1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
2. Color: As selected by Architect from manufacturer's full colors.

C. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gauge, 0.0156 inch (0.40 mm) thick; smooth No. 4 – Brushed finish.

2.3 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 (13 mm); 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 (450 mm) long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

G. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing. Return and brake edges.

2.4 GUTTERS AND DOWNSPOUTS

A. Gutters: Profile as indicated.

B. Downspouts: Rectangular profile.

C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA (ASMM).

D. Accessories: Profiled to suit gutters and downspouts.

1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
2. Gutter Supports: Straps.
3. Downspout Supports: Straps.

E. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3,000 psi (21 MPa) at 28 days, with minimum 5 percent air entrainment.

F. Downspout Extenders: Same material and finish as downspouts.

G. Seal metal joints.

2.5 EXTERIOR PENETRATION FLASHING PANELS

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.6 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers.

B. Underlayment: ASTM D2178/D2178M, glass fiber roofing felt.

C. Slip Sheet: Rosin-sized sheathing paper.

D. Primer Type: Zinc chromate.

E. Concealed Sealants: Non-curing butyl sealant.

F. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

G. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

H. Reglets: Surface-mounted type, galvanized steel; face and ends covered with plastic tape.

I. Solder: ASTM B32, Alloy Grade – Sn50 (50/50).

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, 0.015 inch (0.38 mm).

3.3 INSTALLATION

A. Comply with drawing details.

B. Secure flashings in place using concealed fasteners.

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 1/4 inch per 10 feet (2.1 mm per m), minimum.

H. Set splash pads under downspouts.

3.4 FIELD QUALITY CONTROL

A. See Section 014000 – Quality Requirements for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.5 SCHEDULE

A. Through-Wall Flashing in Masonry:

1. Material: Stainless steel.
2. Thickness: As noted above in Sheet Materials.
3. Finish: As noted above in Sheet Materials..

B. Gutters and Downspouts:

1. Material: Pre-Finished Galvanized Steel.
2. Thickness: As noted above in Sheet Materials.
3. Finish: As noted above in Sheet Materials.

C. Flashings Associated with Shingle Roofing, including Valley, Hip, Ridge, Eave, Gutter Edge, Gable Edge, Chimney:

1. Material: Stainless Steel.
2. Thickness: As noted above in Sheet Materials.
3. Finish: As noted above in Sheet Materials.

D. Roofing Penetration Flashings, for Pipes, Structural Steel, and Equipment Supports:

1. Material: Stainless Steel.

2. Thickness: As noted above in Sheet Materials.
3. Finish: As noted above in Sheet Materials.

E. Window, Door and Wall Opening Flashings:

1. Material: Stainless Steel.
2. Thickness: As noted above in Sheet Materials.
3. Finish: As noted above in Sheet Materials.

END OF SECTION

SECTION 079200 – JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.2 RELATED REQUIREMENTS

A. Section 092116 – Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

1.3 REFERENCE STANDARDS

A. ASTM C661 – Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).

B. ASTM C834 – Standard Specification for Latex Sealants; 2017 (Reapproved 2023).

C. ASTM C919 – Standard Practice for Use of Sealants in Acoustical Applications; 2022.

D. ASTM C920 – Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM C1193 – Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

F. ASTM C1248 – Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.

G. ASTM C1330 – Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2023.

H. ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).

I. SCAQMD 1168 – Adhesive and Sealant Applications; 1989, with Amendment (2022).

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include 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. Backing material recommended by sealant manufacturer.
4. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
5. Substrates the product should not be used on.
6. Substrates for which use of primer is required.
7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
8. Sample product warranty.
9. Certification by manufacturer indicating that product complies with specification requirements.

C. 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.

D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

E. 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.

F. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

G. Installer's qualification statement.

H. Executed warranty.

1.5 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

1.6 WARRANTY

A. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

B. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Nonsag Sealants:

1. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
2. Pecora Corporation: www.pecora.com/#sle.
3. Sika Corporation: www.usa-sika.com/#sle.
4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

B. Self-Leveling Sealants:

1. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
2. Pecora Corporation: www.pecora.com/#sle.
3. Sika Corporation: www.usa-sika.com/#sle.
4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

2.2 JOINT SEALANT APPLICATIONS

A. Scope:

1. Do Not Seal:

a. Intentional weep holes in masonry.
b. Joints indicated to be covered with expansion joint cover assemblies.
c. Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
d. Joints where sealant installation is specified in other sections.
e. Joints between suspended ceilings 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. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.

D. Interior Wet Areas: Bathrooms, restrooms, and kitchens; 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.

F. Areas Where Tamper-Resistance is Required: As indicated on drawings.

2.3 JOINT SEALANTS – GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.4 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus 100 percent and minus 50 percent, minimum.
2. Nonstaining to Porous Stone: Nonstaining 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: 15-20, Shore A, when tested in accordance with ASTM C661.
5. Color: Match adjacent finished surfaces.
6. Service Temperature Range: Minus 20 to 180 degrees F (Minus 29 to 82 degrees C).
7. Products:

    a. Dow; DOWSIL 790 Silicone Building Sealant: www.dow.com/#sle.
    b. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
    c. Sika Corporation; Sikasil WS-290: www.usa.sika.com/#sle.
    d. Tremco Commercial Sealants & Waterproofing; Spectrem 1: www.tremcosealants.com/#sle.
    e. Substitutions: See Section 016000 – Product Requirements.

B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.

1. Color: White.
2. Products:

    a. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com/#sle.
    b. Sika Corporation; Sikasil GP: www.usa.sika.com/#sle.

c. Substitutions: See Section 016000 – Product Requirements.

C. Polyurethane 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: 20 to 35, Shore A, when tested in accordance with ASTM C661.
2. Color: Match adjacent finished surfaces.
3. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
4. Products:

a. Pecora Corporation; DynaTrol II: www.pecora.com/#sle.
b. Sika Corporation; Sikaflex-1a: www.usa.sika.com/#sle.
c. Sika Corporation; Sikaflex-15 LM: www.usa.sika.com/#sle.
d. Sika Corporation; Sikaflex-2c NS: www.usa.sika.com/#sle.
e. Tremco Commercial Sealants & Waterproofing; Dymonic 100: www.tremcosealants.com/#sle.
f. Tremco Commercial Sealants & Waterproofing; Vulkem 116: www.tremcosealants.com/#sle.
g. Substitutions: See Section 016000 – Product Requirements.

D. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.

1. Color: Standard colors matching finished surfaces, Type OP (opaque).
2. Grade: ASTM C834; Grade 0 Degrees F (Minus 18 Degrees C).
3. Products:

a. Pecora Corporation; AC-20 +Silicone: www.pecora.com/#sle.
b. Substitutions: See Section 016000 – Product Requirements.

E. Non-Curing Butyl Sealant: Solvent-based, single component, non-sag, non-skinning, non-hardening, non-bleeding; non-vapor-permeable; intended for fully concealed applications.

1. Products:

a. Pecora Corporation; Pecora BA-98 Non-Skinning Butyl Sealant: www.pecora.com/#sle.
b. Tremco Commercial Sealants & Waterproofing; Acoustical/Curtainwall Sealant: www.tremcosealants.com/#sle.
c. Substitutions: See Section 016000 – Product Requirements.

2.5 SELF-LEVELING JOINT SEALANTS

A. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.

1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
2. Hardness Range: 0 to 15, 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 (Minus 40 to 82 degrees C).
5. Products:

    a. Dow; DOWSIL SL Parking Structure Sealant: www.dow.com/#sle.
    b. Pecora Corporation; Pecora 300 SL (Self-Leveling): www.pecora.com/#sle.
    c. Sika Corporation; Sikasil 728RCS: www.usa.sika.com/#sle.
    d. Tremco Commercial Sealants & Waterproofing; Spectrem 900SL: www.tremcosealants.com/#sle.
    e. Substitutions: See Section 016000 – Product Requirements.

B. 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: To be selected by Architect from manufacturer's standard range.
4. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
5. Products:

    a. Sika Corporation; Sikaflex-1c SL: www.usa.sika.com/#sle.
    b. Substitutions: See Section 016000 – Product Requirements.

C. 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 (1.38 to 1.72 MPa) in accordance with ASTM D412.
5. Products:

    a. Pecora Corporation; DynaTrol II-SG (Slope Grade): www.pecora.com/#sle.
    b. Tremco Commercial Sealants & Waterproofing; THC-901: www.tremcosealants.com/#sle.
    c. Substitutions: See Section 016000 – Product Requirements.

D. Flexible Polyurethane Foam: Single-component, gun grade, and low-expanding.

1. Color: White.
2. Products:

    a. Tremco Commercial Sealants & Waterproofing; ExoAir LEF: www.tremcosealants.com/#sle.
    b. Substitutions: See Section 016000 – Product Requirements.

E. High Quality Latex-Based Sound Sealant: ASTM C834, Type OP an opaque sealant, and Grade 0, 32 degrees F (0 degrees C), meets requirements for low-temperature flexibility.

1. Color: White.

2. Products:

    a. Everkem Diversified Products, Inc; Sound Seal 90: www.everkemproducts.com/#sle.
    b. Substitutions: See Section 016000 – Product Requirements.

2.6 ACCESSORIES

A. Sealant Backing Materials, General: Materials placed in joint before applying sealants; assists sealant performance and service life by developing optimum sealant profile and preventing three-sided adhesion; type and size recommended by sealant manufacturer for compatibility with sealant, substrate, and application.

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, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

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 an inconspicuous area to verify that it does not stain or discolor slab.

3.3 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Install acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:

1. Width/depth ratio of 2:1.
2. Neck dimension no greater than 1/3 of the joint width.
3. Surface bond area on each side not less than 75 percent of joint width.

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. Size Gun Nozzle to fit Joint.

J. Force Sealant into Joints firmly against Joint Sides to fill Joints and Voids solid; superficial pointing with Skin Bead not acceptable.

K. Prevent 3-sided adhesion of Sealant to Substrate.

L. Install Sealant flush with Adjacent Surface.

M. Within 10 minutes after installation, and using Dry Tool finish Sealant to smooth, uniform, and slightly concave shape.

N. Remove excess Sealant and Masking Materials, if any, immediately after Sealant installation.

O. Leave Sealant Surfaces neat and smooth.

P. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.4 FIELD QUALITY CONTROL

A. See Section 014000 – Quality Requirements for additional requirements.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

C. Repair destructive test location damage immediately after evaluation and recording of results.

3.5 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width, i.e., at low temperature in thermal cycle. Report failures immediately and repair them.

END OF SECTION

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Thermally insulated hollow metal doors with frames.

1.2 RELATED REQUIREMENTS

A. Section 087100 – Door Hardware.

B. Section 09 90 00 – Painting and Coating: Field painting.

1.3 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. HMMA: Hollow Metal Manufacturers Association.

C. NAAMM: National Association of Architectural Metal Manufacturers.

D. SDI: Steel Door Institute.

1.4 REFERENCE STANDARDS

A. ADA Standards – 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.

C. ANSI/SDI A250.6 – Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2020.

D. ANSI/SDI A250.8 – Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

E. ANSI/SDI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

F. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

G. ASTM A1008/A1008M – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.

H. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

I. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

J. BHMA A156.115 – Hardware Preparation in Steel Doors and Frames; 2016.

K. ICC A117.1 – Accessible and Usable Buildings and Facilities; 2017.

L. NAAMM HMMA 830 – Hardware Selection for Hollow Metal Doors and Frames; 2002.

M. NAAMM HMMA 831 – Hardware Locations for Hollow Metal Doors and Frames; 2011.

N. NAAMM HMMA 840 – Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.

O. NAAMM HMMA 861 – Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

P. SDI 117 – Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. 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.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Samples: Submit two samples of metal, 2 by 2 inches (51 by 51 mm) in size, showing factory finishes, colors, and surface texture.

E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

G. Manufacturer's Qualification Statement.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: https://steeldoor.org/sdi-certified/#sle.

B. Maintain at project site copies of reference standards relating to installation of products specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Hollow Metal Doors and Frames:

1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
3. Krieger Specialty Products: www.kriegerproducts.com/#sle.
4. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
5. Steelcraft, an Allegion brand: www.allegion.com/#sle.
6. Substitutions: See Section 016000 – Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:

1. 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.
2. Accessibility: Comply with ICC A117.1 and ADA Standards.
3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
4. Door Edge Profile: Manufacturers standard for application indicated.
5. Typical Door Face Sheets: Flush.
6. 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.
7. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.

    a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.

B. 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 gauge, 0.053 inch (1.3 mm), minimum.
    e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.

2. Door Core Material: Vertical steel stiffeners with fiberglass batts.

    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 Drawings.
4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
5. Weatherstripping: Refer to Section 087100.

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.

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 gauge, 0.053 inch (1.3 mm), minimum.
3. Weatherstripping: Separate, see Section 087100.

2.5 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.6 ACCESSORIES

A. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

B. 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.

C. 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 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Coordinate frame anchor placement with wall construction.

C. Install door hardware as specified in Section 087100.

1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.

D. Touch up damaged factory finishes.

3.3 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

3.4 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.5 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 081416 – FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Flush wood doors; flush configuration; non-rated.

1.2 RELATED REQUIREMENTS

A. Section 081113 – Hollow Metal Doors and Frames.

B. Section 087100 – Door Hardware.

1.3 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) – Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

B. AWMAC/WI (NAAWS) – North American Architectural Woodwork Standards; 2021, with Errata.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. 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.

1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
2. Include certification program label.

D. Samples: Submit two samples of door veneer, 6 by 6 inches (153 by 153 mm) in size illustrating wood grain, stain color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special installation instructions.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Specimen warranty.

I. Warranty, executed in Owner's name.

1.5 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than seven years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.6 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.

1.7 WARRANTY

A. Manufacturer Warranty: Provide manufacturer's warranty on interior doors for the life of the installation. Complete forms in Owner's name and register with manufacturer.

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. Wood Veneer Faced Doors:

1. Haley Brothers: www.haleybros.com/#sle.
2. Masonite Architectural: www.architectural.masonite.com/#sle.
3. Oregon Door: www.oregondoor.com/#sle.
4. VT Industries, Inc: www.vtindustries.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

2.2 DOORS

A. Doors: See drawings for locations and additional requirements.

1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
2. Wood Veneer Faced Doors: 5-ply or 7-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.

1. Provide solid core doors at each location, as noted in the door schedule on the drawings.

2.3 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

2.4 DOOR FACINGS

A. Veneer Facing for Transparent Finish: White birch, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.

1. Vertical Edges: Any option allowed by quality standard for grade.
2. "Running Match" each pair of doors and doors in close proximity to each other.

B. Facing Adhesive: Type I – waterproof.

2.5 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:

1. Provide solid blocks at lock edge for hardware reinforcement.

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 AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 – Finishing for grade specified and as follows:

1. Transparent:

    a. System – 9, UV Curable, Acrylated Epoxy, Polyester or Urethane.
    b. Stain: To match VT Industries Alpine AL-18.
    c. Sheen: Semigloss.

B. Seal door top edge with color sealer to match door facing.

2.7 ACCESSORIES

A. Hollow Metal Door Frames: See Section 081113.

B. Door Hardware: See Section 087100.

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.

3.2 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

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.

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.

3.5 SCHEDULE – SEE DRAWINGS

END OF SECTION

SECTION 081613 – FIBERGLASS DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fiberglass doors.

B. Fiberglass door frames.

1.2 RELATED REQUIREMENTS

A. Section 087100 – Door Hardware.

B. Section 088000 – Glazing.

1.3 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 – North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2022.

B. AAMA 1503 – Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

C. ASTM D635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.

D. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

E. ASTM E283/E283M – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

F. ASTM E330/E330M – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

G. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

H. ASTM E2112 – Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2023.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Obtain hardware templates from hardware manufacturer prior to starting fabrication.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.

C. Shop Drawings: Indicate layout and profiles; include assembly methods.

1. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
2. Indicate wall conditions, door and frame elevations, sections, materials, gauges, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on drawings to identify details and openings.

D. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.

E. Door Corner Sample: Submit corner cross sections, 10 inches (254 mm) by 10 inches (254 mm) in size, illustrating construction, finish, color, and texture.

F. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.

G. Manufacturer's qualification statement.

H. Maintenance Data: Include instructions for repair of minor scratches and damage.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Mark doors with location of installation, door type, color, and weight.

B. Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

C. Deliver pre-assembled doors and frames with braces, spreaders, and packaging as required to prevent damage.

D. Store materials in original packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.

1. Store at temperature and humidity conditions recommended by manufacturer.
2. Do not use non-vented plastic or canvas shelters.
3. Immediately remove wet wrappers.

E. Store in position recommended by manufacturer, elevated minimum 4 inches (100 mm) above grade, with minimum 1/4 inch (6 mm) space between doors.

1.8 FIELD CONDITIONS

A. Do not install doors until structure is enclosed.

B. Maintain temperature and humidity at manufacturer's recommended levels during and after installation of doors.

1.9 WARRANTY

A. Provide ten (10) year manufacturer warranty covering materials and workmanship .

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Fiberglass Composite Door Manufacturers:

1. Pella Corporation: www.pellacommercial.com/#sle.
2. Milgard Windows and Doors: www.milgard.com/#sle.
3. Plastpro Inc: www.plastproinc.com/#sle.
4. Special-Lite, Inc: www.special-lite.com/#sle.

2.2 DOOR AND FRAME ASSEMBLIES

A. Basis of Design Product and Manufacturer: Fiberglass Front Door Series, Pella Corporation.

B. Door and Frame Assemblies: Factory-fabricated, prepared and machined for hardware.

1. Operation: Manual.
2. Screw-Holding Capacity: Tested to 890 pounds (404 kg), minimum.
3. Surface Burning Characteristics: Flame spread index (FSI) of 0 to 25, Class A, and smoke developed index (SDI) of 450 or less, when tested in accordance with ASTM E84.
4. Flammability: Self-extinguishing when tested in accordance with ASTM D635.
5. Sizes: As indicated on drawings.
6. Clearance Between Door and Frame: 1/16" inch (1.5 mm), maximum.
7. Clearance Between Bottom of Door and Finished Floor: 3/4 inch (19 mm), maximum; not less than 1/4 inch (6 mm) clearance to threshold.

2.3 COMPONENTS

A. Doors: Fiberglass construction with reinforced core.

1. Type: As indicated on drawings, including swinging doors.
2. Thickness: 1-3/4 inch (44 mm), nominal.
3. Core Material: Manufacturer's standard core material for application indicated.
4. Construction:

    a. Fiberglass faces laminated to core with an applied gel coating, or molded in one piece including gel coating on each side.

5. Face Sheet Texture: Wood grain.
6. Door Panel Configuration: As indicated on drawings.
7. Subframe and Reinforcements: Manufacturer's standard materials.
8. Waterproof Integrity: Provide factory fabricated edges, cut-outs, and hardware preparations of fiberglass reinforced plastic (FRP); provide cut-outs with joints sealed independently of glazing, louver inserts, or trim.
9. Hardware Preparations: Factory reinforce, machine, and prepare for door hardware including field installed items; provide solid blocking for each item; field cutting, drilling or tapping is not permitted; obtain manufacturer's hardware templates for preparation as necessary.
10. Bottom Rail: Provide height necessary to allow up to 1-1/4 inch (32 mm) field cut off at bottom of door without impairing door strength or durability.

B. Door Frames: Provide type in compliance with performance requirements specified for doors.

1. Type: Manufacturer's standard fiberglass frame pre-hung units..
2. Profiles: Manufacturer's standard.
3. Door Stop: Manufacturer's standard.
4. Reinforcing: Provide manufacturer's standard reinforcing at hinge, strike, and closer locations.

2.4 PERFORMANCE REQUIREMENTS

A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.

B. Fiberglass Doors: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific door type:

1. Performance Class (PC): AW.

C. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 7.5 psf (359 Pa).

D. Air Leakage: Maximum of 0.1 cfm per square foot at 6.27 psf (0.5 L/sec/sq m at 300 Pa) differential pressure, when tested in accordance with ASTM E283/E283M.

E. Structural Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

F. Thermal Transmittance, Exterior Doors: AAMA 1503, U-value of as noted on Drawings, measured on exterior door in size required for this project.

2.5 FINISHES

A. Painted: Two-part aliphatic polyurethane, low VOC industrial coating.

1. Thickness: Minimum 5 mils, 0.005 inch (0.127 mm) wet thickness.
2. Color: To match Pella standard Brown.

2.6 HARDWARE

A. Door Hardware: See Section 087100.

2.7 ACCESSORIES

A. Glazing: See Section 088000.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual dimensions of openings by field measurements before door fabrication; show recorded measurements on shop drawings.

B. Do not begin installation until substrates have been properly prepared.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

B. Clean and prepare substrate in accordance with manufacturer's directions.

C. Protect adjacent work and finish surfaces from damage during installation.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.

B. Install exterior doors in accordance with ASTM E2112.

C. Install door hardware as specified in Section 087100.

D. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances; anchor in place.

E. Set thresholds in continuous bed of sealant.

F. In stud walls, install frames prior to building walls; anchor frames to studs using concealed anchors.

G. Separate aluminum and other metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.

H. Repair or replace damaged installed products.

3.4 ADJUSTING

A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.

B. Adjust hardware for smooth and quiet operation.

C. Adjust doors to fit snugly and close without sticking or binding.

3.5 CLEANING

A. Clean installed products in accordance with manufacturer’s instructions prior to owner’s acceptance.

3.6 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 083100 – ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wall- and ceiling-mounted access units.

1.2 RELATED REQUIREMENTS

A. Section 09 90 00 – Paint and Coating: Field paint finish.

1.3 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Manufacturer's Installation Instructions: Indicate installation requirements.

D. Manufacturer's qualification statement.

E. Project Record Documents: Record actual locations of each access unit.

1.4 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 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units :

1. Panel Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.

2. Size: 12 by 12 inches (305 by 305 mm) or as required.

3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.

4. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.

5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.

B. Ceiling-Mounted Units:

1. Panel Material: Steel.

2. Size – Other Ceilings: 12 by 12 inches (305 by 305 mm), as required or as noted on drawings

3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.

4. Large Units Door/Panel: Units larger than 12 by 12 inches (305 by 305 mm) hinged heavy duty with cam lock(s) and no handle.

2.2 WALL- AND CEILING-MOUNTED ACCESS UNITS

A. Manufacturers:

1. Activar Construction Products Group, Inc. – JL Industries: www.activarcpg.com/#sle.

2. ACUDOR Products Inc: www.acudor.com/#sle.

3. Best Access Doors: www.bestaccessdoors.com/#sle.

4. Cendrex, Inc: www.cendrex.com/#sle.

5. Nystrom, Inc: www.nystrom.com/#sle.

6. Studco Building Systems; EZConcept AccessDor : www.studcosystems.com/#sle.

7. Substitutions: See Section 016000 – Product Requirements.

B. Wall- and Ceiling-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.

1. Style: Exposed frame with door surface flush with frame surface.

   a. Gypsum Board Mounting Criteria: Use drywall bead type frame.

2. Door Style: Single thickness with rolled or turned in edges.

3. Heavy-Duty Frames: 14-gauge, 0.0747-inch (1.89 mm) minimum thickness.

4. Single Steel Sheet Door Panels: 16-gauge, 0,0625-inch (1.6 mm) minimum thickness.

5. Insulation: Non-combustible mineral wool or glass fiber.

6. Steel Finish: Primed.

7. Hardware:

    a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.

    b. Latch/Lock: Tamperproof tool-operated cam latch.

    c. Gasketing: Extruded neoprene, around perimeter of door panel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that rough openings are correctly sized and located.

B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to proceeding with this work.

B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.3 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

SECTION 083613 – SECTIONAL DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Overhead sectional doors, electrically operated.

B. Operating hardware and supports.

C. Electrical controls.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Rough wood framing for door opening.

B. Section 079200 – Joint Sealants: Sealing joints between frames and adjacent construction.

1.3 REFERENCE STANDARDS

A. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ASTM C1048 – Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

C. ASTM E283/E283M – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

D. ASTM E330/E330M – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

E. DASMA 102 – American National Standard Specifications for Sectional Doors; 2018.

F. ITS (DIR) – Directory of Listed Products; Current Edition.

G. NEMA ICS 2 – Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).

H. NEMA MG 1 – Motors and Generators; 2021.

I. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

J. NFPA 70 – National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL (DIR) – Online Certifications Directory; Current Edition.

L. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

C. Product Data: Show component construction, anchorage method, and hardware.

D. Samples: Submit two panel finish samples, 6 by 6 inch (152 by 152 mm) in size, illustrating color and finish.

E. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

H. Operation Data: Include normal operation, troubleshooting, and adjusting.

I. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years documented experience.

C. Comply with applicable code for motor and motor control requirements.

D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.

1.6 WARRANTY

A. Extended Correction Period: Correct defective work within a 2-year period commencing on Date of Substantial Completion.

B. Manufacturer Warranty: Provide 5-year manufacturer warranty for electric operating equipment. Complete forms in Owner's name and register with manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: 596 Extra Heavy-Duty/Energy Efficient Thermacore® Doors manufactured by Overhead Door Corporation: www.overheaddoor.com/#sle.

B. Other Acceptable Manufacturers – Sectional Doors:

1. Clopay Building Products: www.clopaydoor.com/#sle.
2. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com/#sle.
3. CornellCookson, LLC.: https://www.cooksondoor.com/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

B. Air Leakage Rate: Less than 0.40 cfm/sq ft (2.0 L/sec/sq m) when tested in accordance with ASTM E283/E283M at test pressure difference of 1.57 psf (75 Pa).

C. Thermal Transmittance: U-factor of 0.057 Btu/hr sq ft degrees F maximum, in accordance with DASMA 102.

2.3 STEEL DOORS

A. Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.

1. Door Panels: Steel construction; outer steel sheet of 20 gauge, 0.0359 inch (0.91 mm) minimum thickness, flush profile; inner steel sheet of 24 gauge, 0.0239 inch (0.61 mm) minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.
2. Door Nominal Thickness: 2 inches (51 mm) thick.
3. Exterior Finish:

    a. Factory finished with standard factory finish; Overhead Door Industrial Brown.

4. Interior Finish:

    a. Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.

5. Glazed Lights: Two glazed lights per panel, two row; set in place with resilient glazing channel.
6. Electric Operation: Electric control station.

2.4 COMPONENTS

A. Track: Rolled galvanized steel, 0.120 inch (3.0 mm) minimum thickness; 3 inch (75 mm) wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch (6 mm) thick.

B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.

C. Lift Mechanism: Torsion spring on cross head shaft.

D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.

E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

F. Head Weatherstripping: EPDM rubber seal, one piece full length.

G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.

H. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.

I. Lock Cylinders: Keyed alike.

2.5 MATERIALS

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.

B. Float Glass: Provide float glass glazing, unless noted otherwise.

1. Heat-Strengthened and Fully Tempered Types: ASTM C1048.

C. Insulation: Foamed-in-place polyurethane, bonded to facing.

1. Same thickness as core framing members.

D. Metal Primer Paint: Zinc molybdate type.

2.6 ELECTRIC OPERATION

A. Basis of Design Operator: RXH Heavy Duty Commercial Operator manufactured by Overhead Door Corporation.

B. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.

1. Provide interlock switches on motor operated units.
2. Provide tamperproof operation cycle counter.

C. Electric Operators:

1. Mounting: Side mounted on cross head shaft.
2. Motor Enclosure:

    a. Exterior Doors: NEMA MG 1, Type 4; open drip proof.

3. Motor Rating: Minimum 3/4 hp (560 W); continuous duty.
4. Motor Voltage: 120 volts, single phase, 60 Hz.
5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
6. Controller Enclosure: NEMA 250, Type 1.
7. Opening Speed: 12 inches per second (300 mm/s).
8. Brake: Adjustable friction clutch type, activated by motor controller.
9. Provide manual override in case of power failure.
10. Provide manufacturer's standard manual operation device for cases of power failure.

D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.

E. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.

1. 24 volt circuit.
2. Surface mounted, at interior door jamb.
3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.

    a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.

F. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

G. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

H. Provide interconnection to security system.

I. Hand Held Transmitter: Digital control, and resettable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Verify that electric power is available and of the correct characteristics.

3.2 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

B. Apply primer to wood frame.

3.3 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Anchor assembly to wall construction and building framing without distortion or stress.

C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

D. Fit and align door assembly including hardware.

E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

F. Install perimeter trim.

3.4 TOLERANCES

A. Maximum Variation from Plumb: 1/16 inch (1.5 mm).

B. Maximum Variation from Level: 1/16 inch (1.5 mm).

C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch (3 mm) from 10 ft (3 m) straight edge.

D. Maintain dimensional tolerances and alignment with adjacent work.

3.5 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.

B. Notify Owner/Owner Representative 24-48 hours in advance and have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

3.6 CLEANING

A. Clean doors and frames and glazing.

B. Remove temporary labels and visible markings.

3.7 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 085413 – FIBERGLASS WINDOWS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Factory fabricated fiberglass windows with fixed and operating sash.

B. Glazed by factory.

C. Operating hardware.

D. Insect screens.

1.2 RELATED REQUIREMENTS

A. Section 072500 – Weather Barriers: Sealing frames to water-resistive barrier installed on adjacent construction.

B. Section 079200 – Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 088000 – Glazing.

1.3 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 – North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2022.

B. ASTM E283/E283M – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

C. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

D. ASTM F588 – Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact; 2017 (Reapproved 2023).

E. FS L-S-125 – Screening, Insect, Nonmetallic; 1972b, with Notice (1987).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide component dimensions, anchors, fasteners, glass, and internal drainage details.

C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements.

D. Samples: Submit (1) one, 6 x 6 inch (152.4 x 152.4 mm) in size, illustrating window frame section.

E. Submit (1) one sample of operating hardware.

F. Manufacturer's Certificate: Certify that products of this section meet or exceed specified requirements.

G. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:

1. Evidence of AAMA Certification.
2. Evidence of WDMA Certification.
3. Evidence of CSA Certification.
4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.

H. Manufacturer's Qualification Statement.

I. Installer's Qualification Statement.

J. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.6 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: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

B. Jig, brace, and box the window frame assemblies for transport to minimize flexing of members or joints.

1.8 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C).

B. Maintain this minimum temperature during and after installation of sealants.

1.9 WARRANTY

A. Correct defective Work within a twenty year period after Date of Substantial Completion.

B. Provide ten year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same. Include coverage for degradation of color finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Fiberglass Windows:

1. Cascadia Windows & Doors; CASCADIA UNIVERSAL SERIES Windows: www.cascadiawindows.com/#sle.
2. Marvin; Elevate Windows: www.marvin.com/#sle.
3. Pella Corporation; Pella Impervia Windows: www.pellacommercial.com/#sle.

2.2 WINDOW UNITS

A. Fiberglass Windows: Hollow, tubular, multi-layer fiber reinforced material; factory fabricated; with vision glass, related flashings, anchorage and attachment devices.

1. Configuration: As indicated on drawings.
2. Product Types: AP – Awning projected window, FW – Fixed window, and H – Hung window, vertically sliding in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
3. Color: To match Pella Brown.
4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
5. 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.
6. Thermal Movement: Design to accommodate thermal movement caused by 100 degrees F (34 degrees C) temperature change without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.

2.3 PERFORMANCE REQUIREMENTS

A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:

1. Performance Class (PC): AW.
2. Performance Grade (PG): Equivalent to or greater than design wind load.

B. Design Pressure (DP): In accordance with applicable codes.

C. Deflection: Limit member deflection to 1/200 of the longer dimension with full recovery of glazing materials.

D. Overall Thermal Transmittance (U-value): See Drawings for maximum, including glazing, measured on window sizes required for this project.

E. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 12.11 pounds per square foot (580 Pa).

F. Air Leakage: 0.3 cfm/sq ft (1.5 L/sec sq m) maximum leakage when tested at 1.57 psf (75 Pa) pressure difference in accordance with ASTM E283/E283M.

G. Forced Entry Resistance for Window Type A: Comply with ASTM F588 for measured performance of Grade 10 in accordance with requirements.

2.4 COMPONENTS

A. Grilles: Between-the-glass:

1. Material: Aluminum.
2. Size: 11/16 inch (17 mm).
3. Shape: Contoured.
4. Color: Match exterior sash.
5. Pattern: Match Drawings.

B. Insect Screen Frame: Rolled aluminum frame of rectangular sections; fit with adjustable hardware; nominal size similar to operable glazed unit.

C. Insect Screens: FS L-S-125 woven plastic mesh; 14/18 mesh size.

1. Color: Black.

D. Operable Sash Weather Stripping: Wool pile; permanently resilient, profiled to effect weather seal.

E. Fasteners: Stainless steel.

2.5 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: See Section 088000 for Types described below:

2.6 HARDWARE

A. Casement and Awning Sash: Zinc die-cast steel worm-gear operator with Painted finish.

1. Operator Linkage, Hinge Slide, and Hinge Arms: 300 series stainless steel.
2. Casement and Awning Sash Lock: Folding arm crank.

B. Double Hung Sash: Metal and nylon spiral friction slide cylinder, each sash, each jamb.

1. Sash Lock: Self-aligning, cam-action lock.

C. Window Opening Control Devices (WOCD): Provide operable window sash hardware that limits openings to only allow passage of 4 inch (102 mm) diameter rigid sphere or less, and are easily releasable to fully open without use of keys, tools, or special knowledge.

D. Finish For Exposed Hardware: Match window finish.

2.7 FABRICATION

A. Fabricate framing, mullions and sash members with fusion welded corners and joints, in a rigid jig. Supplement frame sections with internal reinforcement where required for structural rigidity.

B. Form sills and stools in one piece. Slope sills for wash.

C. Form snap-in glass stops, closure molds, weather stops, and flashings for tight fit into window frame section.

D. Form weather stop flange to perimeter of unit.

E. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

F. Arrange fasteners to be concealed from view.

G. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.

H. Assemble insect screen frame, miter and reinforced frame corners. Fit mesh taut into frame and secure. Fit frame with four spring loaded steel pin retainers.

I. Double weatherstrip operable units.

J. Factory glaze window units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify wall openings and adjoining water-resistive barrier seal materials are ready to receive work of this section.

3.2 INSTALLATION

A. Install windows in accordance with manufacturer's instructions.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

3.3 TOLERANCES

A. Maximum Variation from Level or Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 0.5 inches per 100 ft (12 mm/30 m), whichever is less.

3.4 FIELD QUALITY CONTROL

A. Provide services of fiberglass window manufacturer's field representative to observe for proper installation of system and submit report.

B. See Section 014000 – Quality Requirements for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.

C. Repair or replace fenestration components that have failed designated field observation by manufacturer's representative

3.5 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.6 CLEANING

A. See Section 017419 – Construction Waste Management and Disposal for additional requirements.

B. Remove protective material from pre-finished surfaces.

C. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

D. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 086300 – METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aluminum skylight framing system.

B. Skylight glazing.

C. Fasteners, anchors, reinforcement, and flashings.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Wood support curbs.

B. Section 076200 – Sheet Metal Flashing and Trim: Skylight counterflashing.

C. Section 079200 – Joint Sealants: Sealing joints between skylight frames and adjacent construction.

1.3 REFERENCE STANDARDS

A. AAMA 501.1 – Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure; 2017.

B. AAMA 501.2 – Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

C. AAMA 609 & 610 – Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

D. AAMA 2604 – Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

E. ASTM A36/A36M – Standard Specification for Carbon Structural Steel; 2019.

F. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

G. ASTM B209/B209M – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

H. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

I. ASTM B221M – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

J. ASTM C661 – Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).

K. ASTM C793 – Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants; 2023.

L. ASTM C794 – Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).

M. ASTM C920 – Standard Specification for Elastomeric Joint Sealants; 2018.

N. ASTM C1087 – Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2023.

O. ASTM C1135 – Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants; 2019.

P. ASTM C1184 – Standard Specification for Structural Silicone Sealants; 2023.

Q. ASTM C1249 – Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications; 2018 (Reapproved 2023).

R. ASTM C1401 – Standard Guide for Structural Sealant Glazing; 2023.

S. ASTM D4479/D4479M – Standard Specification for Asphalt Roof Coatings – Asbestos-Free; 2007 (Reapproved 2018).

T. ASTM E283/E283M – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

U. ASTM E330/E330M – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide manufacturer's specifications, standard details, and installation requirements.

C. Shop Drawings: Include details of proposed structural sealant glazing (SSG) and weather sealant joints indicating dimensions, materials, bite, thicknesses, profile, and support framing.

D. Selection Samples: Full range of aluminum finish samples for Architect's color selection.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations.

G. Structural Glazing Adhesive: Product data and calculations showing compliance with performance requirements.

H. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.

I. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

J. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

K. Manufacturer's qualification statement.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not fewer than three years of documented experience.

B. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, shelf-life, storage conditions, and color.

1.6 MOCK-UP

A. See Section 014000 – Quality Requirements for additional requirements.

B. Construct mock-up that includes examples of materials and conditions required in finished skylight installation. Size mock-up 2 by 3 feet (0.61 by 0.91 m).

C. Mock-up may remain as part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Provide wrapping to protect prefinished aluminum surfaces. Do not use adhesive papers or spray coatings that bond when exposed to sunlight or weather.

1.8 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.9 WARRANTY

A. Correct defective work, including leaks, discoloration, failure of seal at insulated glazing units, and excessive thermal or structural movement, within a five year period after Date of Substantial Completion.

B. Manufacturer Warranty: Provide five-year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same. Include coverage for degradation of color finish. Complete forms in Owner's name and register with manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:

1. Velux America, Inc; VELUX FS Skylight with Velux EDM Flashing Kit: www.veluxusa.com/#sle..

B. Other Acceptable Metal-Framed Skylights Manufacturers:

1. Oldcastle Building Envelope: www.obe.com/#sle.
2. Solar Innovations, Inc: www.solarinnovations.com/#sle.
3. Substitutions: See Section 016000 – Product Requirements.

2.2 METAL-FRAMED SKYLIGHTS

A. Metal Framed Skylights: Factory-fabricated, and glazed.

1. Frame: Extruded aluminum structural members with integral condensation collection and guttering system.
2. Glazing System: Four (4)-sided structural sealant glazing (SSG), factory-installed.
3. Glazing: Insulating glass.
4. Aluminum Finish: High performance organic coatings.
5. Color: Match roofing color as close as possible.

2.3 PERFORMANCE REQUIREMENTS

A. Provide metal-framed skylights that comply with the following:

1. Structural Design: Design and size components to withstand dead loads and specified live loads without damage or permanent set.
2. Wind Loads: Test in accordance with ASTM E330/E330M, using loads 1.5 times the specified design pressures and 10 second duration of maximum load.
3. Concentrated Load: Design to withstand 250 pounds (114 kg) concentrated load at any location on framing members without permanent set.
4. Glazing Support Member Deflection Under Wind Load: 1/180 of span, maximum.

5. Thermal Movement: Design system to accommodate thermal expansion and contraction over ambient temperature range of 100 degrees F (55 degrees C), dynamic loading and release of loads, creep of concrete structural members, and deflection of structural support framing without damage to skylight system components or loss of weathertightness.
6. Energy Code Compliance: Comply with Drawings.
7. Air Leakage: 0.30 cfm/sq ft (1.50 L/sec sq m) maximum leakage when tested at 1.57 psf (75 Pa) pressure difference in accordance with ASTM E283/E283M.
8. Air Leakage: 0.30 cfm/sq ft (1.50 L/sec sq m) maximum leakage when tested at 1.57 psf (75 Pa) pressure difference in accordance with ASTM E283/E283M.
9. Structural Sealant Glazing (SSG) System: For individual glass lites, design framing members to not exceed a deflection normal to the wall of L/175 between supports with 3/4 inch (19 mm) maximum, and a deflection parallel to the wall of L/360 with 1/8 inch (3.2 mm) maximum, whichever is less.
10. Water Penetration: None, when measured in accordance with AAMA 501.1 with a test pressure difference of 2.86 pounds per square foot (140 Pa).

2.4 MATERIALS

A. Aluminum Extrusions: Alloy and temper 6063-T5, 6063-T6, or 6061-T6 members complying with ASTM B221 (ASTM B221M), with minimum thickness 1/8 inch (3.2 mm) for structural members and 1/16 inch (1.6 mm) for non-structural members.

B. Formed Aluminum: Sheet material of alloy 5052, 5005, or 6061-T651 members complying with ASTM B209/B209M, with minimum thickness 1/8 inch (3.2 mm) for structural members and 1/16 inch (1.6 mm) for non-structural members.

C. Internal Reinforcement: ASTM A36/A36M Steel shapes as required for strength and mullion size limitations, hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.

D. Insulating Glass: Sealed insulated units, outer pane of clear transparent, tempered glass; inner pane of clear transparent, tempered glass; space of sealed argon gas, metal edge frame.

E. Structural Sealant Glazing (SSG) Adhesive: Neutral curing, silicone sealant formulated for SSG applications in compliance with ASTM C1184 and structural glazing industry guidelines, ASTM C1401.

1. SSG adhesive in compliance with ASTM C920; Type M – Multicomponent, Grade NS, Class 50, Use NT, G, and A.
2. Ultimate Tensile Strength: Minimum of 50 psi (345 kPa) as determined by test method ASTM C1135 under the following conditions.

    a. Exposure to air temperatures of 190 degrees F (88 degrees C) and minus 20 degrees F (minus 29 degrees C).
    b. Water Immersion for seven (7) days, minimum.
    c. Exposure to weathering for 5,000 hours, minimum.

3. Sealant Design Tensile Strength: 20 psi (139 kPa), maximum.
4. Hardness: 20 to 60 with Type A-2 durometer in compliance with test method ASTM C661.

5. SSG sealant tested for compatibility with glazing accessories in compliance with ASTM C1087, tested for accelerated weathering in compliance with ASTM C793.

F. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.

G. Touch-Up Primer for Galvanized Steel Surfaces: Zinc rich type.

H. Protective Back Coating: Asphaltic mastic, ASTM D4479/D4479M Type I.

I. Fasteners: Stainless steel.

J. Flashing: Matching finish of skylight frame system components; secure using concealed fastening method, and seal with weather-tight sealant.

1. Aluminum sheet, 20 gauge, 0.032 inch (0.81 mm) minimum thickness.

K. Anchorage Devices: Type recommended by manufacturer, concealed.

2.5 FABRICATION

A. Rigidly fit and secure joints and corners with screw and spline; fabricate rigid joints with connections that are flush, hairline, and weatherproof.

B. Fabricate components to allow for expansion and contraction with minimum clearance and shim spacing around perimeter of assembly.

C. Drain to exterior any water entering exterior joints, condensation occurring in glazing channels, or migrating moisture occurring within system.

D. Prepare components to receive concealed anchorage devices, and ensure that fasteners will be concealed upon completion of installation.

E. Adhere glass to glazing frames with structural adhesive and cure under controlled conditions in shop. Field glazing of frames to glass is not acceptable.

2.6 FINISHES

A. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system; interior surfaces only.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that structural curb is ready to receive skylight system. Coordinate installation of roofing and other adjacent work to ensure weathertight construction.

3.2 PREPARATION

A. Apply single coat of protective coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

3.3 INSTALLATION

A. Install metal-framed skylights in accordance with manufacturer's instructions.

B. Set skylight structure plumb, level, and true to line, without warp or rack of frames or glazing panels. Anchor securely in place in accordance with approved shop drawings.

C. Maintain assembly dimensional tolerances, aligning with adjacent work.

D. Install base flashings in accordance with Section 076200.

E. Touch up damaged finishes so repair is imperceptible from 6 feet (1.8 m) distance, and remove and replace components that cannot be acceptably touched up.

3.4 TOLERANCES

A. Maximum Variation from Plumb, Level, or Line: 1/8 inch per 10 feet (1 mm per 1 m), or 3/8 inch (9.5 mm) total in overall dimension.

B. Alignment of Two Adjoining Members Abutting in Plane: Within 1/16 inches (1.6 mm).

3.5 FIELD QUALITY CONTROL

A. See Section 014000 – Quality Requirements for general testing and inspection requirements.

B. Repair or replace metal-framed skylight components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.6 CLEANING

A. Upon completion of installation, thoroughly clean skylight aluminum surfaces in accordance with AAMA 609 & 610.

B. Remove protective material from prefinished aluminum surfaces.

C. Wash down exposed surfaces; wipe surfaces clean.

D. Remove excess sealant by methods recommended by skylight manufacturer.

END OF SECTION

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Hardware for wood, hollow metal, and fiberglass doors.

B. Lock cylinders for doors that hardware is specified in other sections.

C. Thresholds.

D. Weatherstripping and gasketing.

1.2 RELATED REQUIREMENTS

A. Section 079200 – Joint Sealants: Sealants for setting exterior door thresholds.

B. Section 081113 – Hollow Metal Doors and Frames.

C. Section 081416 – Flush Wood Doors.

D. Section 081613 – Fiberglass Doors.

1.3 REFERENCE STANDARDS

A. ADA Standards – 2010 ADA Standards for Accessible Design; 2010.

B. BHMA (CPD) – Certified Products Directory; Current Edition.

C. BHMA A156.1 – Standard for Butts and Hinges; 2021.

D. BHMA A156.4 – Door Controls – Closers; 2019.

E. BHMA A156.5 – Cylinders and Input Devices for Locks; 2020.

F. BHMA A156.6 – Standard for Architectural Door Trim; 2021.

G. BHMA A156.7 – Template Hinge Dimensions; 2016.

H. BHMA A156.16 – Auxiliary Hardware; 2023.

I. BHMA A156.17 – Self Closing Hinges & Pivots; 2019.

J. BHMA A156.20 – Standard for Strap and Tee Hinges, and Hasps; 2021.

K. BHMA A156.21 – Thresholds; 2019.

L. BHMA A156.22 – Standard for Gasketing; 2021.

M. BHMA A156.26 – Standard for Continuous Hinges; 2021.

N. BHMA A156.36 – Auxiliary Locks; 2020.

O. BHMA A156.115 – Hardware Preparation in Steel Doors and Frames; 2016.

P. BHMA A156.115W – Hardware Preparation in Wood Doors with Wood or Steel Frames; 2006.

Q. DHI (H&S) – Sequence and Format for the Hardware Schedule; 2019.

R. ICC A117.1 – Accessible and Usable Buildings and Facilities; 2017.

S. NFPA 80 – Standard for Fire Doors and Other Opening Protectives; 2022.

T. NFPA 101 – Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

U. NFPA 105 – Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.

1.4 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. Architect.
2. Installer's Architectural Hardware Consultant (AHC).
3. Hardware Installer.
4. Owner's Security Consultant.

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. Schedule meeting at project site prior to Contractor occupancy.
2. Attendance Required:

    a. Contractor.
    b. Owner.
    c. Installer's Architectural Hardware Consultant (AHC).
    d. Hardware Installer.

3. 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.

4. 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.

5. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.
6. Deliver established keying requirements to manufacturers.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. 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.

C. Shop Drawings – Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.

1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
2. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.
3. List groups and suffixes in proper sequence.
4. Provide complete description for each door listed.
5. Provide manufacturer name, product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
6. Include account of abbreviations and symbols used in schedule.

D. Samples for Verification:

1. Submit minimum size of 2 by 4 inch (51 by 102 mm) for sheet samples, and minimum length of 4 inch (102 mm) for other products.
2. Submit one (1) sample of hinge, latchset, lockset, and closer illustrating style, color, and finish.
3. Return full-size samples to Contractor.
4. Submit product description with samples.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1. Submit manufacturer's parts lists and templates.

G. Keying Schedule:

1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.

H. Manufacturer's qualification statement.

I. Installer's qualification statement.

J. Supplier's qualification statement.

K. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.

L. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 – Product Requirements, for additional provisions.
2. Lock Cylinders: One for each master keyed group.
3. 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.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten 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.

C. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.8 WARRANTY

A. Manufacturer's Warranty: Provide warranty against defects in material and workmanship for period indicated. Complete forms in Owner's name and register with manufacturer.

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. Listed and certified compliant with specified standards by BHMA (CPD).
5. Auxiliary Hardware: BHMA A156.16.
6. Straps and Tee Hinges: BHMA A156.20.
7. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
8. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.

D. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. Refer to Door Hardware Schedule.

E. 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:

1. Ives, an Allegion brand: www.allegion.com/us/#sle.
2. McKinney; an Assa Abloy Group company: www.assaabloydss.com/#sle.
3. Hager Companies: www.hagerco.com/#sle.
4. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

B. Hinges: Comply with BHMA A156.1, Grade 1.

1. Self Closing Hinges: Comply with BHMA A156.17.
2. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.

a. Provide hinge width required to clear surrounding trim.

3. Continuous Hinges: Comply with BHMA A156.26.
4. Provide hinges on every swinging door.
5. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
6. Provide ball-bearing hinges at each door with closer.
7. Provide non-removable pins on exterior outswinging doors.
8. Provide non-removable pins on interior outswinging doors at locations as indicated.
9. Provide following quantity of butt hinges for each door:

a. Doors up to 60 inches (1.5 m) High: Two hinges.
b. Doors From 60 inches (1.5 m) High up to 90 inches (2.3 m) High: Three hinges.
c. Doors 90 inches (2.3 m) High up to 120 inches (3 m) High: Four hinges.

2.3 LOCK CYLINDERS

A. Manufacturers:

1. Schlage, an Allegion brand: www.allegion.com/us/#sle.
2. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com/#sle.
3. Best, dormakaba Group: www.bestaccess.com/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

B. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.

1. Provide standard, 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.
4. Within specific Door Sections, when provisions for lock cylinder are being referenced to this Section, provide specified lock cylinder and keyed to building keying system, unless otherwise indicated.

2.4 AUXILIARY LOCKS (DEADLOCKS)

A. Manufacturers:

1. Best, dormakaba Group: www.bestaccess.com/#sle.
2. Schlage, an Allegion brand: www.allegion.com/us/#sle.
3. Hager Companies: www.hagerco.com/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

B. Auxiliary Locks (Deadlocks): Comply with BHMA A156.36, Grade 1.

1. Type: Bored (cylindrical).
2. Application: Bored.
3. Backset: 2-3/4 inch (70 mm), unless otherwise indicated.
4. Bolt Throw: 1/2 inch (12.7 mm), with latch made of hardened steel.
5. Provide strike that matches frame.

2.5 DOOR PULLS AND PUSH PLATES

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Ives, an Allegion brand: www.allegion.com/us/#sle.
3. Hager Companies: www.hagerco.com/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

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: Stainless steel, unless otherwise indicated.

2.6 CLOSERS

A. Manufacturers; Surface Mounted:

1. Corbin Russwin, Norton, Rixson, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Hager Companies: www.hagerco.com/#sle.
3. LCN, an Allegion brand: www.allegion.com/us/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

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.

2.7 KICK PLATES

A. Manufacturers:

1. Ives, an Allegion brand: www.allegion.com/us/#sle.
2. Standard Metal Hardware Manufacturing Ltd; Door Plates: www.smhardware.com/#sle.
3. Trimco: www.trimcohardware.com/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.

1. Size: 8 inch (203 mm) high by 2 inch (51 mm) less door width (LDW) on push side of door.

2.8 FLOOR STOPS

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Hager Companies: www.hagerco.com/#sle.
3. Ives, an Allegion brand: www.allegion.com/us/#sle.
4. Trimco: www.trimcohardware.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

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.

2.9 WALL STOPS

A. Manufacturers:

1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Hager Companies: www.hagerco.com/#sle.
3. Ives, an Allegion brand: www.allegion.com/us/#sle.
4. Trimco: www.trimcohardware.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

B. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.

1. Provide wall stops to prevent damage to wall surface upon opening door.

2.10 THRESHOLDS

A. Manufacturers:

1. Zero, an Allegion brand: www.allegion.com/us/#sle.
2. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
3. Hager Companies: www.hagerco.com/#sle.
4. National Guard Products, Inc: www.ngpinc.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

B. Thresholds: Comply with BHMA A156.21.

1. Provide threshold at interior doors for transition between two different floor types, and over building expansion joints, unless otherwise indicated.
2. Provide threshold at each exterior door, unless otherwise indicated.
3. Type: Flat surface.
4. Material: Aluminum.
5. Threshold Surface: Fluted horizontal grooves across full width.
6. Field cut threshold to profile of frame and width of door sill for tight fit.
7. Provide non-corroding fasteners at exterior locations.

2.11 WEATHERSTRIPPING AND GASKETING

A. Manufacturers:

1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. Hager Companies: www.hagerco.com/#sle.
3. National Guard Products, Inc: www.ngpinc.com/#sle.
4. Zero International, Inc: www.zerointernational.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

B. Weatherstripping and Gasketing: Comply with BHMA A156.22.

1. Head and Jamb Type: Self-adhesive.

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 with drip flashing, unless otherwise indicated.

2.12 FIRE DEPARTMENT LOCK BOX

A. Manufacturers:

1. Knox Company; Knox-Box Rapid Entry System: www.knoxbox.com/#sle.
2. Substitutions: See Section 016000 – Product Requirements.

B. 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.
2. Capacity: Holds 2 keys.
3. Finish: Manufacturer’s standard dark bronze.

2.13 FINISHES

A. Finishes: Identified in Door Hardware Schedule.

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.

3.2 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: See Section 081113.
2. Flush Wood Doors: See Section 081416.
3. Mounting heights in compliance with ADA Standards:

    a. Locksets: 40-5/16 inch (1024 mm).
    b. Push Plates/Pull Bars: 42 inch (1067 mm).
    c. Deadlocks (Deadbolts): 48 inch (1219 mm).
    d. Exit Devices: 40-5/16 inch (1024 mm).

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.

1. See Section 079200 for additional requirements.

3.3 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014000 – Quality Requirements.

B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUSTING

A. Adjust work under provisions of Section 017700 – Closeout Procedures.

B. Adjust hardware for smooth operation.

C. 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 017700 – Closeout Procedures.

B. Do not permit adjacent work to damage hardware or finish.

3.7 DOOR HARDWARE SETS – SEE THE DOOR HARDWARE SCHEDULE ON THE DRAWINGS FOR DOOR HARDWARE INFORMATION

END OF SECTION

SECTION 088000 – GLAZING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Glazing compounds.

1.2 RELATED REQUIREMENTS

A. Section 072500 – Weather Barriers.

B. Section 079200 – Joint Sealants: Sealants for other than glazing purposes.

C. Section 081613 – Fiberglass Doors: Glazed lites in doors.

D. Section 083613 – Sectional Doors: Glazed lites in doors.

E. Section 085413 – Fiberglass Windows: Glazing provided by window manufacturer.

1.3 REFERENCE STANDARDS

A. ASTM C864 – Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).

B. ASTM C1036 – Standard Specification for Flat Glass; 2021.

C. ASTM C1048 – Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

D. ASTM C1193 – Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

E. ASTM C1376 – Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.

F. ASTM E1300 – Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

G. ASTM E2190 – Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

H. GANA (SM) – GANA Sealant Manual; 2008.

I. NFRC 100 – Procedure for Determining Fenestration Product U-factors; 2023.

J. NFRC 200 – Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.

K. NFRC 300 – Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Samples: Submit 1 samples 5 by 5 inch (127 by 127 mm) in size of glass units.

E. Manufacturer's qualification statement.

F. Installer's qualification statement.

G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 – Product Requirements, for additional provisions.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum seven years of documented experience.

1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.

a. Insulating Glass Certification Council (IGCC).
b. Safety Glazing Certification Council (SGCC).

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.

    a. North American Contractor Certification (NACC) for glazing contractors.
    b. Equivalent independent third-party ANSI accredited certification.

1.6 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 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. Heat Soaked Tempered Glass: Provide a ten (10) year manufacturer warranty to include coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS) inclusions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Glass Fabricators:

1. GGI – General Glass International: www.generalglass.com/#sle.
2. Standard Bent Glass Corp: www.standardbent.com/#sle.
3. Thompson I.G., LLC: www.thompsonig.com/#sle.
4. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com/#sle.
5. Viracon, Inc: www.viracon.com/#sle.
6. Substitutions: See Section 016000 – Product Requirements.

B. Float Glass Manufacturers:

1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
2. Guardian Glass, LLC: www.guardianglass.com/#sle.
3. Pilkington North America Inc: www.pilkington.com/na/#sle.
4. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

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 ASCE 7.
2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
3. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7
4. 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.
5. Glass thicknesses listed are minimum.

B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.

1. In conjunction with weather barrier related materials described in other sections, as follows:

a. Water-Resistive Barriers: See Section 072500.

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. Kind HS – Heat-Strengthened Type: Complies with ASTM C1048.
3. Kind FT – Fully Tempered Type: Complies with ASTM C1048.
4. Heat-Soak Testing (HST): Provide HST of fully tempered glass used on canopy, point-supported, spider wall, high-risk, sloping overhead, horizontal overhead, free-standing glass protective barrier, or other demanding applications of project, to reduce risks of spontaneous breakage due to nickel sulfide (NiS) induced fractures in accordance with industry established testing requirements.

2.4 INSULATING GLASS UNITS

A. Manufacturers:

1. Glass: Any of the manufacturers specified for float glass.
2. Substitutions: See Section 016000 – Product Requirements.

B. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.

C. 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. Metal-Edge Spacers: Aluminum, bent and soldered corners.
4. Spacer Color: Aluminum.
5. Edge Seal:

    a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
    b. Color: Gray.

6. Purge interpane space with dry air, hermetically sealed.

D. Type IG-1 – Insulating Glass Units: Vision glass, double glazed.

1. Applications: Exterior glazing unless otherwise indicated.
2. Space between lites filled with argon.
3. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.

    a. Tint: Clear.
    b. Coating: Low-E (passive type), on #2 surface.

4. Inboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.

    a. Tint: Clear.

5. Total Thickness: 1 inch (25.4 mm).
6. Thermal Transmittance (U-Value), See Drawings.
7. Shading Coefficient: See Drawings.
8. Solar Heat Gain Coefficient (SHGC): See Drawings.

2.5 GLAZING UNITS

A. Type G-1 – Monolithic Interior Vision Glazing:

1. Applications: Interior glazing unless otherwise indicated.
2. Glass Type: Fully tempered and annealed float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch (6.4 mm), nominal.

2.6 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch (75 mm) long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

1. Width: As required for application.
2. Thickness: As required for application.
3. Spacer Rod Diameter: As required for application.
4. Manufacturers:

a. Pecora Corporation: www.pecora.com/#sle.
b. Tremco Global Sealants: www.tremcosealants.com/#sle.
c. Substitutions: See Section 016000 – Product Requirements.

D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

E. Glazing Clips: Manufacturer's standard type.

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, and paint.

3.4 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent 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.

3.5 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 092116 – GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Gypsum wallboard.

B. Joint treatment and accessories.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Building framing, blocking, and sheathing.

B. Section 072100 – Thermal Insulation: Acoustic insulation.

C. Section 072500 – Weather Barriers: Water-resistive barrier over sheathing.

D. Section 079200 – Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.3 REFERENCE STANDARDS

A. AISI S220 – North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.

B. ASTM C1007 – Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020.

C. ASTM C475/C475M – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).

D. ASTM C514 – Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2020).

E. ASTM C557 – Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).

F. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board; 2020.

G. ASTM C1002 – Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.

H. ASTM C1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

I. ASTM C1396/C1396M – Standard Specification for Gypsum Board; 2017.

J. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

K. GA-216 – Application and Finishing of Gypsum Panel Products; 2021.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data:

1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.
2. Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

C. Installer's Qualification Statement.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

B. Documents at Project Site: Maintain at the project site a copy of manufacturer's instructions, erection drawings, and shop drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. See Section 017419 – Construction Waste Management and Disposal for packaging waste requirements.

B. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.

C. Store metal products to prevent corrosion, under cover and above grade.

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.

2.2 BOARD MATERIALS

A. Manufacturers – Gypsum-Based Board:

1. American Gypsum Company: www.americangypsum.com/#sle.
2. CertainTeed Corporation: www.certainteed.com/#sle.
3. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
4. National Gypsum Company: www.nationalgypsum.com/#sle.
5. PABCO Gypsum: www.pabcogypsum.com/#sle.
6. USG Corporation: www.usg.com/#sle.
7. Substitutions: See Section 016000 – Product Requirements.

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. Thickness:

    a. Assemblies: Thicknesses as indicated on drawings.

C. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.

1. Application: Vertical surfaces behind thinset tile, except in wet areas.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Regular Board Thickness: 5/8 inch (16 mm).
4. Edges: Tapered.
5. Products:

    a. American Gypsum Company; M-Bloc: www.americangypsum.com/#sle.
    b. Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board: www.gpgypsum.com/#sle.
    c. Georgia-Pacific Gypsum; DensArmor Plus: www.gpgypsum.com/#sle.
    d. Substitutions: See Section 016000 – Product Requirements.

2.3 GYPSUM BOARD ACCESSORIES

A. Acoustic Insulation: See Section 072100.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

C. Water-Resistive Barrier: See Section 072500.

D. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.

1. Corner Beads: Low profile, for 90 degree outside corners.

E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

1. Paper Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.

2. Joint Compound: Drying type, vinyl-based, ready-mixed.
3. Joint Compound: Setting type, field-mixed.

F. Finishing Compound: Surface coat and primer, takes the place of skim coating.

G. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

H. Nails for Attachment to Wood Members: ASTM C514.

I. Adhesive for Attachment to Wood, ASTM C557 and Metal:

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 C1007AISI S220 and manufacturer's instructions.

B. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

C. Blocking: Install blocking for support of:

1. Framed openings.
2. Wall-mounted cabinets.
3. Plumbing fixtures.
4. Toilet accessories.
5. 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 Wood Framing: For nonrated assemblies, install as follows:

1. Single-Layer Applications: Screw attachment.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

A. Corner Beads: Install at external corners, using longest practical lengths.

B. 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 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
3. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.

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 (0.8 mm).
2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile.
3. Taping, filling, and sanding are not required at base layer of double-layer applications.

3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

3.8 CLEANING

A. See Section 017700 – Closeout Procedures for additional requirements.

B. Clean Level 4 walls of dust before performing final painting.

3.9 PROTECTION

A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

SECTION 093000 – TILING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Ceramic accessories.

D. Ceramic trim.

E. Non-ceramic trim.

1.2 RELATED REQUIREMENTS

A. Section 079200 – Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

B. Section 092116 – Gypsum Board Assemblies: Tile backer board.

1.3 REFERENCE STANDARDS

A. ANSI A108/A118/A136 – American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2019.

B. ANSI A108.1a – American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017 (Reaffirmed 2022).

C. ANSI A108.1b – American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2017.

D. ANSI A108.1c – Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2021).

E. ANSI A108.2 – American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.

F. ANSI A108.4 – American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2019.

G. ANSI A108.5 – American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2021.

H. ANSI A108.6 – American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and – Grout Epoxy; 1999 (Reaffirmed 2019).

I. ANSI A108.8 – American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2019).

J. ANSI A108.9 – American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2019).

K. ANSI A108.10 – American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).

L. ANSI A108.11 – American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.

M. ANSI A108.12 – American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2019).

N. ANSI A108.13 – American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2021).

O. ANSI A108.19 – American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.

P. ANSI A108.20 – American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2020.

Q. ANSI A118.7 – American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.

R. ANSI A118.15 – American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2019.

S. ANSI A136.1 – American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile; 2020.

T. ANSI A137.1 – American National Standard Specifications for Ceramic Tile; 2022.

U. ASCE 7 – Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

V. ASTM C373 – Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).

W. TCNA (HB) – Handbook for Ceramic, Glass, and Stone Tile Installation; 2023.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, perimeter conditions, junctions with dissimilar materials, ceramic accessories, and setting details.

D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches (457 by 457 mm) in size illustrating pattern, color variations, and grout joint size variations.

E. Installer's Qualification Statement:

1. Submit documentation of completion of apprenticeship and certification programs.

F. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 – Product Requirements, for additional provisions.
2. Extra Tile: 2 square feet (0.186 square meters) of each size, color, and surface finish combination.

1.6 QUALITY ASSURANCE

A. Maintain one copy of 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.
2. Installer Certification:

a. Apprenticeship Program: Installer has achieved Journeyworker status through an apprenticeship from the International Union of Bricklayers and Allied Craftworkers (IUBAC) or a U.S. Department of Labor (DOL)-recognized program.

1.7 MOCK-UPS

A. See Section 014000 – Quality Requirements for general requirements for mock-up.

B. Construct four square foot tile mock-up of wall and floor tile each, incorporating all components specified for the location.

1. Approved mock-up may remain as part of work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.9 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F (10 degrees C) and below 100 degrees F (38 degrees C) during installation and curing of setting materials.

PART 2 - PRODUCTS

2.1 TILE

A. Manufacturers: All products of each type by the same manufacturer.

1. American Olean Corporation: www.americanolean.com/#sle.
2. Architessa: www.architessa.com/#sle.
3. Dal-Tile Corporation: www.daltile.com/#sle.
4. Emser Tile, LLC: www.emser.com/#sle.
5. Florim USA: www.milestonetiles.com/#sle.
6. Substitutions: See Section 016000 – Product Requirements.

B. Wall Tile, Type T-1: ANSI A137.1 standard grade.

1. Location: Kitchen splash.
2. Moisture Absorption: 0.5 or less as tested in accordance with ASTM C373.
3. Size: 4 x 12 inches, nominal.
4. Edges: Square.
5. Surface Finish: Matte glaze.
6. Basis of Design Product Name and Manufacturer: Stencil by Daltile.
7. Pattern and Color: White Rectangle SC32.
8. Pattern: Refer to drawings.

C. Glazed Porcelain Floor Tile, Type T-2: ANSI A137.1 standard grade.

1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
2. Size: 12 by 24 inch (305 by 610 mm), nominal.

3. Thickness: 5/16 inch (8 mm).
4. Edges: Square.
5. Surface Finish: Matte glazed.
6. Color(s): Truffle VL64.
7. Basis of Design Product Name and Manufacturer: Volume 1.0 by Daltile.
8. Pattern: Refer to Drawings.
9. Trim Units: Matching cove base and coved base outcorner shapes in sizes indicated.

    a. Field: 6 x 12 coved base.
    b. Corner: 1 x 6 coved base outcorner.

2.2 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.

1. Applications:

    a. Open edges of wall tile.

2. Miter trim and 90 degree corners.
3. Basis of Design Product and Manufacturer: Schiene L-angle Tile Edge Trim by Schluter-Systems to match tile depth.
4. Manufacturers:

    a. Schluter-Systems: www.schluter.com/#sle.
    b. Genesis APS International: www.genesis-aps.com/#sle.
    c. Substitutions: See Section 016000 – Product Requirements.

2.3 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:

1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
2. Bostik Inc: www.bostik-us.com/#sle.
3. Custom Building Products: www.custombuildingproducts.com/#sle.
4. LATICRETE International, Inc: www.laticrete.com/#sle.
5. Merkrete, by Parex USA, Inc: www.merkrete.com/#sle.
6. Substitutions: See Section 016000 – Product Requirements.

C. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.

1. Applications: Use this type of bond coat where Large and Heavy Tile (LHT) mortar is indicated.
2. Products:

    a. ARDEX Engineered Cements; S 28: www.ardexamericas.com/#sle.

b. Custom Building Products; Complete Contact-LFT Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer: www.custombuildingproducts.com/#sle.
c. H.B. Fuller Construction Products, Inc; TEC TotalFlex 150 Universal Mortar: www.tecspecialty.com/#sle.
d. LATICRETE International, Inc; MULTIMAX LITE: www.laticrete.com/#sle.
e. Substitutions: See Section 016000 – Product Requirements.

D. Organic Adhesive: ANSI A136.1, thinset mastic type.

1. Applications: Wall tile installations.
2. Products:

a. ARDEX Engineered Cements; ARDEX D14: www.ardexamericas.com/#sle.
b. Custom Building Products; ReliaBond Ceramic Tile Adhesive – Type 1: www.custombuildingproducts.com/#sle.
c. LATICRETE International, Inc; LATICRETE 15 Premium Mastic: www.laticrete.com/#sle.
d. Substitutions: See Section 016000 – Product Requirements.

2.4 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:

1. ARDEX Engineered Cements: www.ardexamericas.com/#sle.
2. Custom Building Products: www.custombuildingproducts.com/#sle.
3. LATICRETE International, Inc: www.laticrete.com/#sle.
4. Merkrete, by Parex USA, Inc: www.merkrete.com/#sle.
5. Substitutions: See Section 016000 – Product Requirements.

C. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified 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 (3.2 mm) wide and larger; use unsanded grout for joints less than 1/8 inch (3.2 mm) wide.
3. Color(s): As selected by Architect from manufacturer's full line.
4. Products:

a. ARDEX Engineered Cements; ARDEX FL: www.ardexamericas.com/#sle.
b. Custom Building Products; Prism Color Consistent Grout: www.custombuildingproducts.com/#sle.
c. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com/#sle.
d. Substitutions: See Section 016000 – Product Requirements.

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): Color to match grout..
3. Products:

a. ARDEX Engineered Cements; ARDEX SX: www.ardexamericas.com/#sle.
b. Custom Building Products; Commercial 100% Silicone Caulk: www.custombuildingproducts.com/#sle.
c. LATICRETE International, Inc; LATICRETE LATASIL: www.laticrete.com/#sle.
d. Merkrete, by Parex USA, Inc; Merkrete Colored Caulking: www.merkrete.com/#sle.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.

1. Composition: Water-based colorless silicone.
2. Products:

a. STONETECH, a Division of LATICRETE International, Inc; STONETECH Heavy Duty Grout Sealer: www.laticrete.com/#sle.
b. Merkrete, by Parex USA, Inc; Merkrete Revive: www.merkrete.com/#sle.
c. Substitutions: See Section 016000 – Product Requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subfloor 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 subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).

1. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

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. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.3 INSTALLATION – GENERAL

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly.

D. 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.

E. Form internal angles square and external angles square.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Sound tile after setting. Replace hollow sounding units.

H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

I. Grout tile joints unless otherwise indicated.

J. 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 polymer modified grout, unless otherwise indicated.

3.5 INSTALLATION – WALL TILE

A. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

3.6 CLEANING

A. Clean tile and grout surfaces.

3.7 PROTECTION

A. Protect for four days after installation.

END OF SECTION

SECTION 095100 – ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.2 RELATED REQUIREMENTS

A. Section 072100 – Thermal Insulation: Acoustical insulation.

1.3 REFERENCE STANDARDS

A. ASCE 7 – Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM C635/C635M – Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

D. ASTM C636/C636M – Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.

E. ASTM E580/E580M – Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2022.

F. ASTM E1264 – Standard Classification for Acoustical Ceiling Products; 2023.

G. CHPS (HPPD) – High Performance Products Database; Current Edition.

H. UL (GGG) – GREENGUARD Gold Certified Products; Current Edition.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until, 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.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Samples: Submit two samples 4 by 4 inch (152 by 152 mm) in size illustrating material and finish of acoustical units.

D. Samples: Submit two samples each, 6 inches (152 mm) long, of suspension system main runner, cross runner, and perimeter molding.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 – Product Requirements, for additional provisions.
2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.6 QUALITY ASSURANCE

A. Designer Qualifications for Seismic Design: Perform under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the State in which the Project is located.

B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.

C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.

1.7 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), 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: www.armstrongceilings.com/#sle.
2. CertainTeed Corporation: www.certainteed.com/#sle.
3. USG Corporation: www.usg.com/ceilings/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

B. Suspension Systems:

1. Same as for acoustical units.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design Category D, E, or F and complying with the following:

1. Local authorities having jurisdiction.

2.3 ACOUSTICAL UNITS

A. Acoustical Units – General: ASTM E1264, Class A.

1. VOC Content: Certified as Low Emission by one of the following:

a. Product listing in UL (GGG).
b. Product listing in CHPS (HPPD).

B. Acoustical Panels: Painted mineral fiber, with the following characteristics:

1. Classification: ASTM E1264.
2. Size: 24 by 24 inches (610 by 610 mm).
3. Thickness: 5/8 inch (16 mm).
4. Panel Edge: Angled tegular.
5. Color: White.
6. Suspension System: Exposed grid.
7. Basis of Design Product:

a. Armstrong World Industries, Inc; Fine Fissured: www.armstrongceilings.com/#sle.
b. Substitutions: See Section 016000 – Product Requirements.

2.4 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems – General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.

B. Metal Suspension Systems – General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.

1. Materials:

a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.

C. Exposed Suspension System: Hot-dipped galvanized steel grid with steel cap.

1. Application(s): Seismic.
2. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
3. Profile: Tee; 15/16 inch (24 mm) face width.
4. Finish: Baked enamel.
5. Color: White.

2.5 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch (2 mm) galvanized steel wire.

C. Hold-Down Clips: Manufacturer's standard clips to suit application.

D. Seismic Clips: Manufacturer's standard clips for seismic conditions and to suit application.

E. Perimeter Moldings: Same metal and finish as grid.

F. Touch-up Paint: Type and color to match acoustical and grid units.

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 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

3.3 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. 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.

E. Seismic Suspension System, Seismic Design Categories D, E, F: Hang suspension system with grid ends attached to the perimeter molding on two adjacent walls; on opposite walls, maintain a 3/4 inch (19 mm) clearance between grid ends and wall.

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 (152 mm) of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

3.4 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 acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:

1. Cut to fit irregular grid and perimeter edge trim.
2. Make field cut edges of same profile as factory edges.
3. Double cut and field paint exposed reveal edges.

3.5 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.6 CLEANING

A. Clean surfaces.

B. Replace damaged or abraded components.

END OF SECTION

SECTION 096500 – RESILIENT FLOORING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

1.2 RELATED REQUIREMENTS

A. Section 033000 – Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

1.3 REFERENCE STANDARDS

A. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).

B. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

C. ASTM F1861 – Standard Specification for Resilient Wall Base; 2021.

D. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

E. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

F. NFPA 253 – Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

D. Verification Samples: Submit two samples, 4 by 4 inch (101.6 by 101.6 mm) in size illustrating color and pattern for each resilient flooring product specified.

E. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

F. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

G. Installer's Qualification Statement.

H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 – Product Requirements, for additional provisions.
2. Extra Flooring Material: 64 square feet (6 square meters) of each type and color.
3. Extra Wall Base: 15 linear feet (4.572 linear meters) of each type and color.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.6 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 (13 degrees C) and 90 degrees F (72 degrees C).

D. Protect roll materials from damage by storing on end.

E. Do not double stack pallets.

1.7 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 (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).

PART 2 - PRODUCTS

2.1 TILE FLOORING

A. Vinyl Tile – LVT-01 – Common Areas:: Surface-decorated, with wear layer.

1. Manufacturers:

    a. Mannington Commercial: www.manningtoncommercial.com#sle.
    b. TAJ Flooring: www.tajflooring.com/#sle.
    c. Mohawk: https://www.mohawkgroup.com/#sle.
    d. Substitutions: See Section 016000 – Product Requirements.

2. Basis of Design Product Name: Mohawk Reforestation.
3. Basis of Design Product Style: Reforestation – C0188
4. Type of Construction; Commercial Grade Luxury Vinyl Tile.
5. Width: 9.25 inches.
6. Thickness: 4.5 mm
7. Wear Layer: 20 mil.
8. Length: 59 inches.
9. Basis of Design Color and Pattern: Yosemite – 868.
10. Warranty: 20 Year Commercial Limited Warranty.
11. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.

2.2 RESILIENT BASE

A. Resilient Base – Type RB-01:

1. Manufacturers:

    a. Flexco Corporation: www.flexcofloors.com/#sle.
    b. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
    c. Mannington Commercial: www.manningtoncommercial.com#sle.
    d. Roppe Corporation: www.roppe.com/#sle.
    e. Armstrong Flooring: www.armstrongflooring.com/#sle.
    f. Substitutions: See Section 016000 – Product Requirements.

2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
3. Material: Thermoplastic Rubber.
4. Profile: Coved
5. Height: 4 inch (100 mm).
6. Thickness: 0.125 inch (3.2 mm).
7. Finish: Satin.
8. Length: Roll.
9. Basis of Design Product and Manufacturer: Smokey Gray – R48SG by Armstrong Flooring.

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. Adhesive for Vinyl Flooring and Base: Per manufacturers recommendations and requirements

D. Moldings, Transition and Edge Strips: Same material resilient base.

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 Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).

1. Test as Follows:

a. Alkalinity (pH): ASTM F710.
b. Internal Relative Humidity: ASTM F2170.
c. Moisture Vapor Emission: ASTM F1869.

2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.2 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

D. Clean substrate.

3.3 INSTALLATION – GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Adhesive-Applied Installation:

1. Spread only enough adhesive to permit installation of materials before initial set.
2. Fit joints and butt seams tightly.
3. Set flooring in place, press with heavy roller to attain full adhesion.

D. Loose-Laid Installation: Set flooring in place in accordance with manufacturer's instructions.

E. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

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.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

C. Install plank tile with a random offset of at least 6 inches (152 mm) from adjacent rows.

3.5 INSTALLATION – RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.

B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. 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

SECTION 096813 – TILE CARPETING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.2 RELATED REQUIREMENTS

A. Section 017419 – Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap and removed carpet tile.

B. Section 033000 – Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied flooring.

1.3 REFERENCE STANDARDS

A. ASTM D2859 – Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016 (Reapproved 2021).

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

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. Manufacturer's Qualification Statement.

F. Installer's Qualification Statement.

G. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 – Product Requirements, for additional provisions.
2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum ten years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.6 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:

1. Interface, Inc: www.interface.com/#sle.
2. Mannington Commercial: www.manningtoncommercial.com#sle.
3. Milliken & Company: www.milliken.com/#sle.
4. Mohawk Group: www.mohawkgroup.com/#sle.
5. Shaw Contract: www.shawcontract.com/en-us.
6. Substitutions: See Section 016000 – Product Requirements.

2.2 MATERIALS

A. Tile Carpeting, Type CPT-01: Tufted, solution died.

1. Basis of Design Manufacturer and Product: Mohawk Visual Connections Tile.
2. Tile Size and Type: 12 by 36 inch (305 by 915 mm) nominal heavy wear carpet tile.
3. Style: Visual Connections.
4. Style Number: GT470.
5. Color: Taupe #859.
6. Installation Method/Pattern: Half Lap
7. Weight: 18.0 oz/yd² (610 g/m²).
8. Confirmation: Confirm with client before ordering.
9. Flammability: ASTM E 648 Class 1 (Glue Down).
10. Static Propensity: AATCC – 134 Under 3.5 KV.

2.3 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Edge Strips: Embossed aluminum, color as selected by Architect.

C. 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.

D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).

1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.2 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor 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 subfloor 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. Locate change of color or pattern between rooms under door centerline.

F. Fully adhere carpet tile to substrate.

G. Trim carpet tile neatly at walls and around interruptions.

H. Complete installation of edge strips, concealing exposed edges.

3.4 CLEANING

A. See Section 017700 – Closeout Procedures for additional requirements.

B. Remove excess adhesive without damage, from floor, base, and wall surfaces.

C. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 099000 – PAINTING AND COATING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Interior painting and coating systems.

C. Exterior painting and coating systems.

D. Scope:

1. Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

a. Exterior:

1) Concrete: Cementitious siding and poured-in-place concrete.
2) Metal: Aluminum, galvanized, steel and ferrous metals.
3) Wood: Beams, columns, siding and trim staining.

b. Interior:

1) Metal: Aluminum and galvanized, steel and ferrous metals.
2) Wood: Trim.
3) Drywall: Walls, ceilings, gypsum board, and similar items.

1.2 RELATED REQUIREMENTS

A. Section 055000 – Metal Fabrications: Shop-primed items.

1.3 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D – National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. SCAQMD 1113 – Architectural Coatings; 1977, with Amendment (2016).

C. SSPC-SP 1 – Solvent Cleaning; 2015, with Editorial Revision (2016).

D. SSPC-SP 2 – Hand Tool Cleaning; 2018.

E. SSPC-SP 6 – Commercial Blast Cleaning; 2007.

F. SSPC-SP 13 – Surface Preparation of Concrete; 2018.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Product characteristics.
2. Surface preparation instructions and recommendations.
3. Primer requirements and finish specification.
4. Storage and handling requirements and recommendations.
5. Application methods.
6. Clean-up information.

C. Samples: Submit four paper draw down samples, 8-1/2 by 11 inches (216 by 279 mm) in size, illustrating range of colors available for each finishing product specified.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Applicator's qualification statement.

F. Maintenance Data: Submit coating maintenance manual including finish schedule showing where each product/color/finish was used, product technical data sheets, safety data sheets (SDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 – Product Requirements for additional provisions.
2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
3. Label each container with color in addition to manufacturer's label.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

1.6 MOCK-UPS

A. See Section 014000 – Quality Requirements for general requirements for mock-ups.

B. Provide one accent wall as directed by Architect to demonstrate color and finish.

C. Provide door and frame assembly indicating paint color, texture, and finish.

D. Locate as part of the final work.

E. Mock-up may remain as part of the work.

1.7 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, product name, product code, color designation, VOC content, batch date, environmental handling, surface preparation, application, and use instructions.

C. Paint Materials: Store at a minimum of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

D. Handling: Maintain a clean, dry storage area to prevent contamination or damage to materials.

1.8 FIELD CONDITIONS

A. Do not apply materials when environmental conditions are outside the ranges required by manufacturer.

B. Follow manufacturer's recommended procedures for producing the best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Products: Subject to compliance with requirements, provide Sherwin-Williams Company (The) products indicated; www.sherwin-williams.com/#sle.

B. Comparable Products: Products of approved manufacturers will be considered in accordance with 016000 – Product Requirements, and the following:

1. Products are approved by manufacturer in writing for application specified.
2. Products that meet or exceed performance and physical characteristics of basis of design products.
3. Other Acceptable Manufacturers:

    a. Benjamin Moore.
    b. Kelly Moore.
    c. PPG Industries.

2.2 PAINTINGS AND COATINGS

A. General:

1. Provide factory-mixed coatings unless otherwise indicated.
2. Do not reduce, thin, or dilute coatings or add materials to coatings unless specifically indicated in manufacturer's instructions.

B. Volatile Organic Compound (VOC) Content:

1. Provide paints and finishes that comply with the most stringent requirements specified in the following:

   a. SCAQMD 1113 Rule.
   b. Architectural coatings VOC limits of State in which the project is located.

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site, or other method acceptable to authorities having jurisdiction.

C. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

2.3 PAINT SYSTEMS – EXTERIOR

A. Concrete: Cementitious siding and poured-in-place concrete.

1. Latex Systems:

   a. Satin Finish:

      1) 1st Coat: Sherwin-Williams Loxon Concrete and Masonry Primer Sealer LX02W50: www.sherwin-williams.com/#sle.

         a) 5.3 to 8 mils wet, 2.1 to 3.2 mils dry.

      2) 2nd and 3rd Coat: Sherwin-Williams A-100 Exterior Latex Satin, A82 Series: www.sherwin-williams.com/#sle.

         a) 4 mils wet, 1.5 mils dry per coat.

B. Metal: Aluminum, galvanized, steel and ferrous metals.

1. Alkyd Systems, Water Based:

   a. Semi-Gloss Finish:

      1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: www.sherwin-williams.com/#sle.

         a) 5 mils wet, 2 mils dry per coat.

      2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series: www.sherwin-williams.com/#sle.

         a) 4 to 5 mils wet, 1.4 to 1.7 mils dry per coat.

C. Wood: Siding and trim.

1. Opaque Finish -Latex Systems:

    a. Satin Finish:

        1) 1st Coat: Sherwin-Williams Latex Wood Primer, B42W8041: www.sherwin-williams.com/#sle.

            a) 4 mils wet, 1.4 mils dry per coat.

        2) 2nd and 3rd Coat: Sherwin-Williams A-100 Exterior Latex Satin, A82 Series: www.sherwin-williams.com/#sle.

            a) 4 mils wet, 1.5 mils dry per coat.

2. Transparent Finish – Stain, Water Reducible Systems:

    a. Semi-Transparent:

        1) 1st and 2nd Coat: Sherwin-Williams WoodScapes Exterior Polyurethane Semi-Transparent Stain, A15T00005: www.sherwin-williams.com/#sle.

            a) 100 to 350 sq ft/gal (2.5 to 8.6 sq m/L).
            b) Color: SW3511 – Cedar Bark

2.4 PAINT SYSTEMS – INTERIOR

A. Metal: Aluminum and galvanized, steel and ferrous metals.

1. Latex Systems:
2. Alkyd Systems, Water Based:

    a. Low Sheen Finish:

        1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: www.sherwin-williams.com/#sle.

            a) 5 mils wet, 2 mils dry per coat.

        2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Low Sheen, B53-1250 Series: www.sherwin-williams.com/#sle.

            a) 4 to 5 mils wet, 1.4 to 1.7 mils dry per coat.

B. Wood: Trim.

1. Stain and Varnish System:

    a. Satin Finish:

1) 1st Coat: Sherwin-Williams Minwax Performance Series Tintable Wood Stain 250 VOC: www.sherwin-williams.com/#sle.
2) 2nd and 3rd Coat: Sherwin-Williams Minwax Waterbased Oil-Modified Polyurethane: www.sherwin-williams.com/#sle.

a) 4 mils wet, 1 mil dry per coat.

C. Drywall: Walls, ceilings, gypsum board, and similar items.

1. Latex Systems:

a. Eg-Shel Finish High Performance (HP):

1) 1st Coat: Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W2600: www.sherwin-williams.com/#sle.

a) 4 mils wet, 1.5 mils dry per coat.

2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 HP Zero VOC Eg-Shel, B20-1950 Series: www.sherwin-williams.com/#sle.

a) 4 mils wet, 1.7 mils dry per coat.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

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 mildew from impervious surfaces by scrubbing with solution of water and bleach. Rinse with clean water and allow surface to dry.

D. Concrete:

1. Remove release agents, curing compounds, efflorescence, and chalk.
2. Fill bug holes, air pockets, and other voids with cement patching compound.
3. Prepare concrete according to SSPC-SP 13.

E. Cementitious Siding: Remove dirt, dust and other foreign matter. Pressure clean, if needed, to remove grease, oil, and loose particles.

F. Gypsum Board: Fill minor defects with filler compound; sand smooth and remove dust prior to painting.

G. Aluminum: Remove surface contamination and oil; wash with solvent according to SSPC-SP 1.

H. Galvanized Surfaces:

1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
2. Prepare surface according to SSPC-SP 2.

I. 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. Prime bare steel surfaces.
3. Remove rust, loose mill scale, and other foreign substances using methods recommended by paint manufacturer and blast cleaning according to SSPC-SP 6. Protect from corrosion until coated.

J. Wood: Remove dust, grit, and foreign matter. Scrape, sand, and spot prime knots and pitch streaks. Fill nail holes and imperfections with wood filler and sand smooth.

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.

C. Apply coatings at spread rate required to achieve manufacturer's recommended dry film thickness.

D. Regardless of number of coats specified, apply additional coats until complete hide is achieved.

3.4 PRIMING

A. Apply primer to all surfaces unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

B. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to top coat manufacturers.

3.5 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.6 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 101423 – PANEL SIGNAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Panel signage.

1.2 REFERENCE STANDARDS

A. ADA Standards – 2010 ADA Standards for Accessible Design; 2010.

B. ICC A117.1 – Accessible and Usable Buildings and Facilities; 2017.

1.3 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Manufacturer's product literature for each type of panel sign, indicating styles, font, foreground and background colors, locations, and overall dimensions of each sign.

C. Shop Drawings:

1. Include dimensions, locations, elevations, materials, text and graphic layout, attachment details, and schedules.
2. Schedule: Provide information sufficient to completely define each panel sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.

    a. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
    b. When content of signs is indicated to be determined later, request such information from Owner at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
    c. Submit for approval by Owner prior to fabrication.

D. Samples: Submit two samples of each type of sign, of size similar to that required for project, indicating sign style, font, and method of attachment.

E. Selection Samples: Where colors, materials, and finishes are not specified, submit two sets of color selection charts or chips.

F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

G. Manufacturer's qualification statement.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

1.5 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 under cover and elevated above grade.

D. Store tape adhesive at normal room temperature.

1.6 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain minimum ambient temperature during and after installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Panel Signage:

1. Best Sign Systems, Inc: www.bestsigns.com/#sle.
2. FASTSIGNS International, Inc: www.fastsigns.com/#sle.
3. Inpro Corporation: www.inprocorp.com/#sle.
4. Mohawk Sign Systems, Inc: www.mohawksign.com/#sle.
5. Seton Identification Products: www.seton.com/aec/#sle.
6. Takeform: www.takeform.net/#sle.
7. Vista System LLC: www.vistasystem.com/#sle.
8. Substitutions: See Section 016000 – Product Requirements.

2.2 REGULATORY REQUIREMENTS

A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.3 PANEL SIGNAGE

A. Panel Signage:

1. Application: Room, door, and evacuation map signs.
2. Description: Flat signs with applied character panel media, tactile characters.
3. Sign Size: 4 inches by 6 inches (100 mm by 152 mm) except evacuation map signage.
4. Total Thickness: 1/8 inch (3 mm).
5. Sign Edges: Squared.
6. Letter Edges: Squared.
7. Color and Font, unless otherwise indicated:

    a. Character Font: Helvetica, Arial, or other sans serif font.
    b. Character Case: Upper and lower case (title case).
    c. Background Color: As selected from manufacturer's standard colors.
    d. Character Color: As selected from manufacturer's standard colors.

8. Material: Acrylic plastic base with applied plastic letters and braille.
9. Profile: Flat panel without frame.
10. Tactile Letters: Raised 1/32 inch minimum.
11. Braille: Grade II, ADA-compliant.
12. One-Sided Wall Mounting: Tape adhesive.

2.4 SIGNAGE APPLICATIONS

A. Room and Door Signs:

1. Office Doors: Identify with room names and numbers to be determined later, not those indicated on drawings including braille.
2. Conference and Meeting Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings including braille.
3. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings including braille.
4. Rest Rooms: Identify with pictograms, the name "Unisex", room numbers to be determined later, including braille.

2.5 ACCESSORIES

A. Tape Adhesive: Double-sided tape, permanent adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install with horizontal edges level.

C. Locate panel signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 102800 – TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Commercial toilet accessories.

B. Commercial shower and bath accessories.

1.2 RELATED REQUIREMENTS

A. Section 093000 – Tiling: Ceramic washroom accessories.

1.3 REFERENCE STANDARDS

A. ASTM A269/A269M – Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2022.

B. ASTM A666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

C. ASTM B456 – Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017 (Reapproved 2022).

D. ASTM C1036 – Standard Specification for Flat Glass; 2021.

E. ASTM C1503 – Standard Specification for Silvered Flat Glass Mirror; 2018.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures, for submittal requirements.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 - PRODUCTS

2.1 MANUFACTURERS TOILET AND BATHSHOWER ACCESSORIES

A. Commercial Toilet, Shower, and Bath Accessories:

1. AJW Architectural Products: www.ajw.com/#sle.
2. American Specialties, Inc: www.americanspecialties.com/#sle.
3. Bradley Corporation: www.bradleycorp.com/#sle.
4. Bobrick Washroom Equipment, Inc; www.bobrick.com/#sle
5. Substitutions: Section 016000 – Product Requirements.

B. Provide products of each category type by single manufacturer.

2.2 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. Keys: Provide keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

H. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

2.4 COMMERCIAL TOILET ACCESSORIES

A. Toilet Paper Dispenser: Single roll, surface mounted bracket type, stainless steel.

1. Basis of Design Manufacturer and Product: Bobrick Washroom Equipment, Inc.; Surface-Mounted Single-Roll Toilet Tissue Dispenser B-76857.

B. Combination Towel Dispenser/Waste Receptacle: Recessed flush with wall, stainless steel; seamless wall flanges, continuous piano hinges, tumbler locks on upper and lower doors.

1. Waste receptacle liner: Reusable, heavy-duty vinyl.
2. Towel dispenser capacity: 600 C-fold or 800 multifold paper towels.
3. Waste receptacle capacity: 12 gallons (45 liters).
4. Basis of Design Manufacturer and Product: Bobrick Washroom Equipment, Inc.; ClassicSeries® Recessed Convertible Paper Towel Dispenser And Waste Receptacle B-3942.

C. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and stainless steel tank and working parts; push type soap valve, check valve, and window gauge refill indicator, tumbler lock.

1. Basis of Design Manufacturer and Product: Bobrick Washroom Equipment, Inc.; ConturaSeries Surface-Mounted Soap Dispenser 818615.
2. Minimum Capacity: 40 ounces (1.18 liters).

D. Mirrors: Stainless steel framed, 1/4 inch (6 mm) thick annealed float glass; ASTM C1036.

1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
2. Sizes: As indicated on drawings.
3. Frame: 0.05 inch (1.3 mm)angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
4. Backing: Full-mirror sized, minimum 0.03 inch (0.8 mm) galvanized steel sheet and nonabsorptive filler material.
5. Basis of Design Manufacturer and Product: Bobrick Washroom Equipment, Inc.; Glass Mirror With Stainless Steel Angle Frame B-290 Series.

E. Seat Cover Dispenser: Stainless steel, surface-mounted, reloading by concealed opening at base.

1. Minimum capacity: 250 seat covers.
2. Basis of Design Manufacturer and Product: Bobrick Washroom Equipment, Inc.; ClassicSeries Surface-Mounted Seat-Cover Dispenser B-221.

F. Grab Bars: Stainless steel, smooth surface.

1. Standard Duty Grab Bars:

    a. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
    b. Dimensions: 1-1/2 inch (38 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, concealed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
    c. Finish: Satin.
    d. Length and Configuration: As indicated on drawings.
    e. Basis of Design Manufacturer and Product: Bobrick Washroom Equipment, Inc.; 1 1/2" Diameter Stainless Steel Grab Bars With Snap Flange B-6806 Series.

G. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking panel with stainless steel piano-type hinge, removable receptacle.

1. Finish: Satin.
2. Basis of Design Manufacturer and Product: Bobrick Washroom Equipment, Inc.; Surface-Mounted Sanitary Napkin Disposal B-254.

2.5 COMMERCIAL SHOWER AND BATH ACCESSORIES

A. Shower Curtain Rod: Stainless steel tube, 1 inch (25 mm) outside diameter, 0.04 inch (1.0 mm) wall thickness, satin-finished stainless steel flanges, for concealed mounting.

1. Basis of Design Manufacturer and Product: Bobrick Washroom Equipment, Inc.; Heavy-Duty Shower Curtain Rod with Concealed Mounting B-207.

B. Shower Curtain:

1. Material: Opaque vinyl, 0.008 inch (0.2 mm) thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
2. Size: Minimum 70" x 72" (1778 mm x 1830 mm), hemmed edges.
3. Grommets: Stainless steel; pierced through top hem on 6 inch (150 mm) centers.
4. Color: White.
5. Shower Curtain Hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
6. Basis of Design Manufacturer and Products: Bobrick Washroom Equipment, Inc.; Vinyl Shower Curtains 204-3 and Stainless Steel Shower Curtain Hooks 204-1.

C. Towel Bar: Stainless steel, 3/4 inch (20 mm) square tubular bar; rectangular brackets, concealed attachment, satin finish.

1. Basis of Design Manufacturer and Products: Bobrick Washroom Equipment, Inc.; Surface-Mounted Towel Bar B-6737 x 24.

D. Coat Hook: Heavy-duty stainless steel, double-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

1. Basis of Design Manufacturer and Product: Bobrick Washroom Equipment, Inc.; Surface-Mounted Double Coat Hook B-76727.

2.6 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Specified in Plumbing sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. 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, unless otherwise indicated.

1. Grab Bars: As indicated on drawings.
2. Mirrors: Maximum 40 inch (1016 mm), measured from floor to bottom of mirrored surface.
3. Other Accessories: As indicated on drawings.

3.4 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 104400 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Wood blocking product and execution requirements.

1.3 REFERENCE STANDARDS

A. ASTM E814 – Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

B. FM (AG) – FM Approval Guide; Current Edition.

C. NFPA 10 – Standard for Portable Fire Extinguishers; 2022.

D. UL (DIR) – Online Certifications Directory; Current Edition.

1.4 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide extinguisher operational features, color and finish, anchorage details, and installation instructions.

C. Shop Drawings: Indicate locations of cabinets, cabinet physical dimensions, rough-in measurements for recessed cabinets, locations of individual fire extinguishers, mounting measurements for wall bracket, installation procedures, and accessories required for complete installation.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.5 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. Activar Construction Products Group, Inc. – JL Industries: www.activarcpg.com/#sle.
2. Ansul, a Tyco Business: www.ansul.com/#sle.
3. Nystrom, Inc: www.nystrom.com/#sle.

B. Fire Extinguisher Cabinets and Accessories:

1. Activar Construction Products Group, Inc. – JL Industries: www.activarcpg.com/#sle.
2. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
3. Nystrom, Inc: www.nystrom.com/#sle.

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) or FM (AG) for purpose specified and as indicated.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.

1. Class: A:B:C type.
2. Size: 5 pound (2.27 kg).
3. Finish: Baked polyester powder coat, red color.
4. Temperature range: Minus 40 degrees F (Minus 40 degrees C) to 120 degrees F (49 degrees C).

2.3 FIRE EXTINGUISHER CABINETS

A. Basis of Design Product and Manufacturer: AL2409-R3 by Larson's

B. Cabinet Construction: Non-fire rated.

1. Formed primed steel sheet; 0.036 inch (0.9 mm) thick base metal.

C. Cabinet Configuration: Semi-recessed type.

1. Size to accommodate accessories.

2. Projected Trim: Returned to wall surface in radiused configuration.
3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim.

D. Door: 0.036 inch (0.9 mm) metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.

E. Door Glazing: Float glass, clear, 1/8 inch (3 mm) thick, and set in resilient channel glazing gasket.

F. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

G. Fabrication: Weld, fill, and grind components smooth.

H. Finish of Cabinet Exterior Trim and Door: Anodized to clear color.

I. Finish of Cabinet Interior: White colored enamel.

2.4 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Lettering: FIRE EXTINGUISHER decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

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 level in wall openings, 32 inches (813 mm) from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets.

3.3 MAINTENANCE

A. See Section 017700 – Closeout Procedures, for additional requirements relating to maintenance service.

3.4 MAINTENANCE – SELF-SERVICE FIRE EXTINGUISHERS

A. Annual Inspections: Inspect self-service fire extinguishers on annual basis in accordance with manufacturer's instructions, and requirements of the authorities having jurisdiction (AHJ).

B. Inspection Certification Tag: Provide new tag indicating acceptable condition of fire extinguisher, date of inspection, and name of self-service inspector for each inspection.

END OF SECTION

SECTION 113013 – APPLIANCES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Kitchen appliances.

1.2 REFERENCE STANDARDS

A. UL (DIR) – Online Certifications Directory; Current Edition.

1.3 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of equipment specified.

C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and 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. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).

1.5 WARRANTY

A. Provide five (5) year manufacturer warranty on refrigeration system of refrigerators.

B. Provide ten (10) year manufacturer warranty on magnetron tube of microwave ovens.

C. Provide ten (10) year manufacturer warranty on tub and door liner of dishwashers.

PART 2 - PRODUCTS

2.1 MAUFACTURERS

A. Whirlpool Corporation: www.whirlpool.com/#sle.

B. GE Appliances: www.geappliances.com/#sle.

C. Kenmore: www.kenmore.com/#sle

2.2 KITCHEN APPLIANCES

A. Provide Equipment Eligible for Energy Star Rating: Energy Star Rated.

B. Refrigerator, Type REFR-1: Free-standing, top-mounted freezer, and frost-free.

1. Basis of Design Manufacturer and Product: GE GTE17GSNRSS
2. Capacity: Total minimum storage of 16.6 cubic ft (0.47 cu m); minimum 25 percent freezer capacity with icemaker kit.
3. Features:

    a. ADA Compliant.
    b. ENERGY STAR® Certified.
    c. Sliding Deli Drawer.
    d. Adjustable Wire Freezer Shelf.
    e. Upfront Temperature Controls.
    f. LED Lighting.
    g. High-Gloss Handles.
    h. Optional Icemaker Kit.
    i. Edge-to-Edge Glass Shelves.
    j. Clear Crisper Drawers.
    k. Dairy Compartment.
    l. Gallon Door Storage Bins.

4. Exterior Finish: Stainless Steel

C. Microwave: MICRO-1 – Countertop.

1. Basis of Design Manufacturer and Product: GE JES1657SMSS
2. Capacity: 1.6 cubic ft (0.04 cu m).
3. Power: 1150 watts.
4. Features:

    a. Turntable.
    b. Light.
    c. Sensor cooking.
    d. Weight and time defrost .
    e. 10 power levels.
    f. Add 30 seconds.
    g. Timer.
    h. Control lock.
    i. Touch controls in stainless steel.

5. Exterior Finish: Stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify utility rough-ins are provided and correctly located.

3.2 INSTALLATION

A. Confirm electrical manufacturers electrical and plumbing requirements have been provided before installation

B. Install in accordance with manufacturer's instructions.

C. Anchor built-in equipment in place.

D. Protect appliances until Substantial Completion.

3.3 ADJUSTING

A. Adjust equipment to provide efficient operation.

3.4 CLEANING

A. Remove packing materials from equipment and properly discard.

B. Wash and clean equipment.

END OF SECTION

SECTION 122113 – HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Horizontal slat louver blinds.

B. Operating hardware.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.3 REFERENCE STANDARDS

A. WCMA A100.1 – Standard for Safety of Window Covering Products; 2022.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the placement of concealed blocking to support blinds. See Section 061000.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide data indicating physical and dimensional characteristics.

C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.

D. Samples: Submit two samples, 12 inch (304.8 mm) long illustrating slat materials and finish, cord type and color.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 – Product Requirements, for additional provisions.
2. Extra Slats: 20 of each type and size.
3. Extra Lift Cords, Control Cords, and Wands: Two of each type.

1.6 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. Horizontal Louver Blinds Without Side Guides:

1. Hunter Douglas Architectural: www.hunterdouglasarchitectural.com/#sle.
2. Levolor: www.levolor.com/commercial/#sle.
3. SWFcontract, a division of Springs Window Fashions, LLC: www.swfcontract.com/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

B. Source Limitations: Furnish blinds and associated controls produced by a single manufacturer and obtained from a single supplier.

2.2 BLINDS WITHOUT SIDE GUIDES

A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.

B. Manual Operation: Control of raising and lowering by cord with full range locking; blade angle adjustable by control wand.

C. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed.

1. Width: 1/2 inch (12 mm).
2. Thickness: 0.008 inch (0.20 mm).
3. Color: As selected by Architect.

D. Slat Support: Woven polypropylene cord, ladder configuration.

E. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.

1. Color: Same as slats.

F. Bottom Rail: Pre-finished, formed steel; with end caps.

1. Color: Same as headrail.

G. Lift Cord: Braided nylon; continuous loop; complying with WCMA A100.1.

1. Free end weighted.

H. Control Wand: Extruded hollow plastic; hexagonal shape.

1. Non-removable type.
2. Color: Clear.

I. Headrail Attachment: Wall brackets.

J. Accessory Hardware: Type recommended by blind manufacturer.

2.3 FABRICATION

A. Determine sizes by field measurement.

B. Fabricate blinds to cover window frames completely.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that openings are ready to receive the work.

B. Ensure structural blocking and supports are correctly placed. See Section 061000.

3.2 INSTALLATION

A. Install blinds in accordance with manufacturer's instructions.

B. Secure in place with flush countersunk fasteners.

3.3 TOLERANCES

A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch (6 mm).

B. Maximum Offset From Level: 1/8 inch (3 mm).

3.4 ADJUSTING

A. Adjust blinds for smooth operation.

3.5 CLEANING

A. Clean blind surfaces just prior to occupancy.

END OF SECTION

SECTION 123200 – MANUFACTURED WOOD CASEWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manufactured standard casework, with cabinet hardware.

B. Countertops.

1.2 RELATED REQUIREMENTS

A. Section 061000 – Rough Carpentry: Blocking and nailers for anchoring casework.

B. Section 079200 – Joint Sealants: Sealing joints between casework and countertops and adjacent walls, floors, and ceilings.

C. Section 092116 – Gypsum Board Assemblies: Reinforcements in metal-framed partitions for anchoring casework.

1.3 DEFINITIONS

A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches (1.066 m) above finished floor, tops of cases less than 72 inches (1.82 m) above finished floor and all members visible in open cases or behind glass doors.

B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches (1.828 m) above finished floor and bottoms of cabinets more than 30 inches (0.762 m) but less than 42 inches (1.066 m) above finished floor.

C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches (762 mm) above finished floor.

1.4 REFERENCE STANDARDS

A. ANSI A135.4 – Basic Hardboard; 2012 (Reaffirmed 2020).

B. AWI (QCP) – Quality Certification Program; Current Edition.

C. AWI/AWMAC/WI (AWS) – Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

D. AWMAC/WI (NAAWS) – North American Architectural Woodwork Standards; 2021, with Errata.

E. BHMA A156.9 – Cabinet Hardware; 2020.

F. HPVA HP-1 – American National Standard for Hardwood and Decorative Plywood; 2020.

G. NEMA LD 3 – High-Pressure Decorative Laminates; 2005.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.6 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Component dimensions, configurations, construction details, joint details, attachments.

C. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements, placement dimensions and tolerances, clearances required, and keying information.

D. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 2 inches by 3 inches (51 mm by 75 mm).

1. Plastic laminate samples, for color, texture, and finish selection.

E. Manufacturer's Installation Instructions.

F. Installer's Qualification Statement.

G. Maintenance Data: Manufacturer's recommendations for care and cleaning.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:

1. See Section 016000 – Product Requirements for additional provisions.
2. Tools: One each of every special tool required for maintenance of cabinets.

I. Finish touch-up kit for each type and color of materials provided.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.

1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
2. Provide designated labels on shop drawings as required by certification program.
3. Provide designated labels on installed products as required by certification program.
4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
5. Replace, repair, or rework all work for which certification is refused.

C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.

B. Acceptance at Site:

1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.

C. Storage:

1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" Article of this section.

1.9 MOCK-UPS

A. Provide full size base cabinet complete with drawers, door, adjustable shelf, and countertop.

B. See Section 014000 – Quality Requirements for additional requirements.

C. Mock-up may remain as part of the work.

1.10 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:

1. Ruptured, cracked, or stained finish coating.
2. Discoloration or lack of finish integrity.
3. Cracking or peeling of finish.
4. Delamination of components.

5. Failure of adhesives.
6. Failure of hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Plastic Laminate Casework:

1. Case Systems: www.casesystems.com/#sle.
2. Diversified Fixture: www.diversifiedfixture.com/#sle.
3. Labscape LLC: www.labscape.com/#sle.
4. Substitutions: See Section 016000 – Product Requirements.

B. Obtain casework from single source and manufacturer, unless otherwise indicated.

2.2 CASEWORK, GENERAL

A. Quality Standard: AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Plastic Laminate Faced Cabinets: Custom Grade.

2.3 FABRICATION

A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.

B. Construction: As required for selected grade.

C. Structural Performance: Safely support the following minimum loads:

1. Base Units: 500 pounds per linear foot (744 kgs/linear m) across the cabinet ends.
2. Suspended Units: 300 pounds (136 kg) static load.
3. Drawers: 125 pounds (57 kg), minimum.
4. Hanging Wall Cases: 300 pounds (135 kg).
5. Shelves: 100 pounds (45 kg), minimum.

D. Seismic Performance: Casework, including attachments to other work, able to withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor: 1.0.

E. Hardware Application: Factory-machine casework members for hardware that is not surface applied.

F. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

G. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.

2.4 PLASTIC-LAMINATE-CLAD CASEWORK

A. Plastic-Laminate-Clad Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.

1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.
2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:

    a. Base Cabinets: 24 inches (610 mm).
    b. Tall Cabinets: 13 inches (330 mm).
    c. Wall Cabinets: 13 inches (330 mm).

3. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.

    a. Finish: Matte or suede, gloss rating of 5 to 20.
    b. Welcome Center Surface Color and Pattern: Match Wilsonart Fonthill Pear 10745 – 60 Matte Finish.
    c. Administration Surface Color and Pattern: Match Wilsonart Fashion Grey D381 – 60 Matte Finish.
    d. Exposed Interior Surfaces: Thermally fused laminate.

        1) Color: White.

    e. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
    f. Cap exposed plastic laminate finish edges with material of same finish and pattern.

2.5 COUNTERTOPS

A. Plastic Laminate Countertops: High pressure decorative laminate sheet bonded to substrate.

1. Manufacturer's standard configuration for exposed edges, back and end splashes.
2. Fabricate in accordance with manufacturer's standard requirements.
3. Surface Color and Pattern: Match Wilsonart Oiled Soapstone 4882 – 38 Fine Velvet Texture Finish.

2.6 CABINET HARDWARE

A. Comply with BHMA A156.9 requirements.

1. Acceptable base materials for plated finishes include brass, bronze, and steel.

B. Locks: Provide locks on casework drawers and doors where indicated. Lock with 5 pin cylinder and 2 keys per lock.

1. Hinged Doors: Cam type lock, bright chromium plated over nickel on base material.
2. Keying: Key locks alike within a space; key each room separately.
3. Master Key System: All locks operable by master key.

C. Shelves in Cabinets:

1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.

D. Swinging Doors: Hinges, pulls, and catches.

1. Hinges: Concealed, number as required by referenced standards for width, height, and weight of door.

a. Concealed Hinges: Installed in cabinet edge, and on door back, bright chromium plated over nickel on base material.

1) European-Style Hinges for Overlay Doors: 110 degree opening angle.

2. Pulls: Chrome wire pulls, 4 inches (102 mm) wide.

a. Pull design to comply with project's referenced accessibility requirements.

3. Catches: Magnetic.

E. Drawers: Pulls and slides.

1. Pulls: Chrome wire pulls, 4 inches (102 mm) wide.

a. Pull design to comply with project's referenced accessibility requirements.

2. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

2.7 MATERIALS

A. Wood-Based Materials:

1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.
2. Composite Wood Panels: Containing no urea-formaldehyde resin binders.

B. Solid Wood: Clear, dry, sound, plain sawn, selected for compatible species, grain and color, no defects.

C. Semi-Exposed Solid Wood: Dry, sound, plain sawn, no appearance defects, any species similar in color and grain to exposed portions.

D. Hardwood Plywood: Veneer core; HPVA HP-1 Grade as indicated; same species as exposed solid wood, clear, compatible grain and color, no defects. Band exposed edges with solid wood of same species as veneer.

E. Concealed Solid Wood or Plywood: Any species and without defects affecting strength or utility.

F. Hardboard: ANSI A135.4, Class 1, tempered.

G. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications. complying with Grade requirements, and standard with the manufacturer.

H. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.

2.8 ACCESSORIES

A. 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.

B. Concealed Joint Fasteners: Corrosion-resistant, standard with manufacturer.

C. Grommets: Standard plastic grommets for cut-outs, in color to contrast with adjacent surface.

D. Sealant for Use in Casework Installation:

1. Manufacturer's recommended type.

PART 3 - EXECUTION

3.1 PREPARATION

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

3.2 EXAMINATION

A. Site Verification of Environmental Conditions:

1. Do not deliver casework until the following conditions have been met:

a. Building has been enclosed (windows and doors sealed and weather-tight).
b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
c. Ceiling, overhead ductwork, piping, and lighting have been installed.
d. Installation areas do not require further “wet work” construction.

B. For Base Cabinets Installation: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 1/2 inch (13 mm) leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.

C. For Wall Cabinets Installation: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:

1. Maximum variation from plane of masonry wall exceeds 1/4 inch in 10 ft (6 mm/3 m) and 1/2 inch in 20 ft (13 mm/6 m) or more, and/or maximum variation from plumb exceeds 1/4 inch (6 mm)per story.
2. Maximum Variation of finished gypsum board surface from true flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

D. Verify adequacy of support framing and anchors.

E. Verify that service connections are correctly located and of proper characteristics.

3.3 INSTALLATION

A. Perform installation in accordance with manufacturer's instructions.

B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.

C. Set casework items plumb and square, securely anchored to building structure.

D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.

E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch (1.6 mm). In addition, do not exceed the following tolerances:

1. Variation of Tops of Base Cabinets from Level: 1/16 inch (1.6 mm) in 10 feet (3 m).
2. Variation of Bottoms of Wall Cabinets from Level: 1/8 inch (3 mm) in 10 feet (3 m).
3. Variation of Faces of Cabinets from a True Plane: 1/8 inch (3 mm) in 10 feet (3 m).
4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch (0.8 mm).
5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch (1.6 mm).

F. Secure wall and floor cabinets to concealed reinforcement at gypsum board assemblies.

G. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches (407 mm) on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.

H. Wall Cabinets: Fasten to hanging strips, and/or wall substrates. Fasten each cabinet through back, near top, at not less than 16 inches (407 mm) on center.

I. Install hardware uniformly and precisely.

J. Countertops: Install countertops intended and furnished for field installation in one true plane, with ends abutting at hairline joints, and no raised edges.

K. Replace units that are damaged, including those that have damaged finishes.

3.4 ADJUSTING

A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

3.5 CLEANING

A. Clean casework and other installed surfaces thoroughly.

3.6 PROTECTION

A. Do not permit finished casework to be exposed to continued construction activity.

B. Protect casework and countertops from ongoing construction activities. Prevent workmen from standing on, or storing tools and materials on casework or countertops.

C. Repair damage, including to finishes, that occurs prior to Date of Substantial Completion, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION

SECTION 133419 – METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manufacturer-engineered, shop-fabricated structural steel building frame for the for the Shop Parking Structure shown on the Drawings.

1.2 RELATED REQUIREMENTS

A. Section 079200 – Joint Sealants: Sealing joints between accessory components.

1.3 REFERENCE STANDARDS

A. AISC 360 – Specification for Structural Steel Buildings; 2022.

B. ASTM A36/A36M – Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

D. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

E. ASTM A500/A500M – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021a.

F. ASTM A501/A501M – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

G. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

H. ASTM C827/C827M – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures; 2023.

I. ASTM C1107/C1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

J. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

K. ASTM E96/E96M – Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).

L. ASTM F3125/F3125M – Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.

M. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

N. AWS B2.1/B2.1M – Specification for Welding Procedure and Performance Qualification; 2021.

O. AWS D1.1/D1.1M – Structural Welding Code – Steel; 2020, with Errata (2023).

P. IAS AC472 – Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2018.

Q. MBMA (MBSM) – Metal Building Systems Manual; 2019.

R. SSPC-Paint 20 – Zinc-Rich Coating (Type I – Inorganic, and Type II – Organic); 2019.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1. If the schedule is different for manufacturer-engineered, shop-fabricated buildings/structures, schedule multiple meetings.

B. Contractor to provide design and construction for all manufacturer-engineered, shop-fabricated structural steel buildings/structures including permitting and permitting fees.

1.5 SUBMITTALS

A. See Section 013300 – Submittal Procedures for submittal requirements.

B. Product Data: Provide data on profiles, component dimensions, fasteners.

C. Shop Drawings: Provide building column reactions for worst case load combinations indicating if loads are ASD or LRFD; indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchors and methods of anchorage, and installation; framing anchor bolt settings, sizes, locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

D. Samples: Submit two samples of precoated metal roof panels for each color selected, 6" by 24" inch (152.4 by 609.6 mm) in size illustrating color and texture of finish.

E. Manufacturer's Instructions: Indicate preparation requirements, anchor bolt placement, and other items for architectural and structural review.

F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

G. Designer's Qualification Statement.

H. Manufacturer's Qualification Statement: Provide documentation showing metal building manufacturer is accredited under IAS AC472.

1. Include statement that manufacturer designs and fabricates metal building system as integrated components and assemblies, including but not limited to primary structural members, secondary members, joints, roof, and wall cladding components specifically designed to support and transfer loads and properly assembled components form a complete or partial building shell.

I. Erector's Qualification Statement.

J. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

K. Project Record Documents: Record actual locations of concealed components and utilities.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.

1. Design Engineer Qualifications: Licensed in State of Washington.
2. Comply with applicable code for submission of drawings and design calculations stamped and signed by a professional engineer as required for acquiring permits.
3. Cooperate with regulatory agency or authorities having jurisdiction (AHJ), and provide data as requested.

B. Perform work in accordance with AISC 360 and MBMA (MBSM).

1. Maintain one copy of the above on site.

C. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.

1. Not less than 10 years of documented experience.
2. Accredited by IAS in accordance with IAS AC472.

D. Erector Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

E. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

1.7 WARRANTY

A. See Section 017700 – Closeout Procedures for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty for all materials.

1. Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking, or crazing, blistering, peeling, chalking, or fading. Include coverage for weather tightness of building enclosure elements after installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Metal Buildings Systems:

1. Butler Manufacturing Company: www.butlermfg.com/#sle.
2. Ceco Building Systems: www.cecobuildings.com/#sle.
3. Chief Buildings: www.chiefbuildings.com/#sle.
4. Kirby Building Systems, a Nucor Company: www.kirbybuildingsystems.com/#sle.
5. Metallic Building Systems: www.metallic.com/#sle.
6. Nucor Building Systems: www.nucorbuildingsystems.com/#sle.
7. Red Dot Buildings: www.reddotbuildings.com/#sle.
8. VP Buildings: www.vp.com/#sle.
9. Substitutions: See Section 016000 – Product Requirements.

2.2 ASSEMBLIES

A. Single span rigid frame.

B. Bay Spacing: See Structural Drawings.

C. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, intermediate columns, and braced end frames, and wind bracing.

D. Secondary Framing: Purlins, Girts, Eave struts, Flange bracing, Sill supports, and Clips, and other items detailed.

E. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly and liner panels, and accessory components.

F. Roof Slope: As shown on Drawings.

2.3 PERFORMANCE REQUIREMENTS

A. Design structural members to withstand dead load, applicable snow load, loading in accordance with earthquake design requirements, and design loads due to pressure and suction of wind calculated in accordance with applicable code and Structural Drawings.

B. Roof system shall withstand imposed loads with maximum allowable deflection of 1/180 of span.

C. Provide drainage to exterior for water entering or condensation occurring within roof system.

D. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 140 degrees F (78 degrees C).

E. Size and fabricate roof systems free of distortion or defects detrimental to appearance or performance.

2.4 MATERIALS – FRAMING

A. Structural Steel Members: ASTM A36/A36M.

B. Structural Tubing: ASTM A500/A500M Grade B cold-formed.

C. Plate or Bar Stock: ASTM A36, Grade 36.

D. Anchor Rods/Bolts: ASTM F1554, Grade 36 unless otherwise noted, with hot dip type for protective coatings.

E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1; galvanized to ASTM A153/A153M.

F. Welding Materials: Perform in accordance with AWS D1.1/D1.1M.

G. Primer: SSPC-Paint 20 zinc rich.

H. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch (13.7 MPa).
2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch (48 MPa).
3. Height Change, Plastic State: When tested in accordance with ASTM C827/C827M:

    a. Maximum: Plus 4 percent.
    b. Minimum: Plus 1 percent.

2.5 MATERIALS – ROOF

A. Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, Designation SS (structural steel), Grade 33 (230), with G90/Z275 coating.

B. Metal Building Type, Factory Applied, Vapor-Barrier Insulation Facings: Water vapor permeance no greater than 0.10 perm (5.7 ng/(Pa s sq m)) when tested in accordance with ASTM E96/E96M; flame spread index of 25 or less, and smoke developed index of 40 or less when tested in accordance with ASTM E84.

C. Joint Seal Gaskets: Manufacturer's standard type.

D. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A153/A153M, finish to match adjacent surfaces when exterior exposed.

E. Bituminous Paint: Asphaltic type.

F. Sealant: Manufacturer's standard type.

G. Trim, Closure Pieces, Caps, Flashings, Gutters, Downspouts, Rain Water Diverter, Fascias, and Infills: Same material, thickness, and finish as exterior sheets; brake formed to required profiles.

2.6 FABRICATION – FRAMING

A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.

B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.

2.7 FABRICATION – ROOF PANELS

A. Roofing: Minimum 0.030 inch (0.76 mm) metal thickness, matching standing seam metal panels of Section 074113.

B. Flashings, Closure Pieces, Caps: Same material and finish as adjacent material.

C. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

2.8 FABRICATION – GUTTERS AND DOWNSPOUTS

A. Fabricate of same material and finish as roofing metal.

B. Form gutters and downspouts to collect and remove water per building code. Fabricate with connection pieces.

C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.

D. Fabricate support straps of same material and finish as roofing metal, color as selected.

2.9 FINISHES

A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.

B. Interior Surfaces of Roof and Wall Components and Accessories: Precoated enamel on steel of modified silicone finish, white color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

3.2 ERECTION – FRAMING

A. Erect framing in accordance with AISC 360.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated by Designer.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

D. Do not field cut or alter structural members without approval.

E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.3 ERECTION – ROOF PANELS

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned.

D. Locate end laps over supports. End laps minimum 2 inches (50 mm). Place side laps over bearing.

E. Use concealed fasteners.

F. Install sealant and gaskets, providing weather tight installation.

3.4 ERECTION – GUTTERS AND DOWNSPOUTS

A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.

B. Apply bituminous paint on surfaces in contact with cementitious materials.

C. Slope gutters minimum 1/8" per foot

D. Connect downspouts to storm sewer system per civil drawings.

3.5 TOLERANCES

A. Framing Members: 1/4 inch (6 mm) from level; 1/8 inch (3 mm) from plumb.

B. Roofing: 1/8 inch (3 mm) from true position.

END OF SECTION

SECTION 220000 – PLUMBING BASIC REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work included in 220000, Plumbing Basic Requirements applies to Division 22, Plumbing work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of plumbing systems for proposed project.

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, and Addenda. Confirm requirements before commencement of work.

C. Definitions:

1. Provide: To furnish and install, complete and ready for intended use.
2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.
4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent", substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.
5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's Authorized Representative, and other reviewing entity whose approval is required to obtain systems acceptance.

1.02 RELATED SECTIONS

A. Contents of Section applies to Division 22, Plumbing Contract Documents.

B. Related Work:

1. Additional conditions apply to this Division including, but not limited to:

a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
b. Drawings
c. Addenda
d. Owner/Architect Agreement
e. Owner/Contractor Agreement
f. Codes, Standards, Public Ordinances and Permits

1.03 REFERENCES AND STANDARDS

A. References and Standards per Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, individual Division 22, Plumbing Sections and those listed in this Section.

B. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:

1. State of Washington:

a. IBC – International Building Code
b. IFC – International Fire Code
c. IMC – International Mechanical Code
d. NEC – National Electrical Code
e. UPC – Uniform Plumbing Code
f. WAC – Washington Administrative Code
g. WSEC – Washington State Energy Code

C. Reference standards and guidelines include but are not limited to the latest adopted editions from:

1. ABA – Architectural Barriers Act
2. ADA – Americans with Disabilities Act
3. AHRI – Air-Conditioning Heating & Refrigeration Institute
4. ANSI – American National Standards Institute
5. ASCE – American Society of Civil Engineers
6. ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers
7. ASHRAE Guideline 0, the Commissioning Process
8. ASME – American Society of Mechanical Engineers
9. ASPE – American Society of Plumbing Engineers
10. ASSE – American Society of Sanitary Engineering
11. ASTM – ASTM International
12. AWWA – American Water Works Association
13. CFR – Code of Federal Regulations
14. CGA – Compressed Gas Association
15. CISPI – Cast Iron Soil Pipe Institute
16. ETL – Electrical Testing Laboratories
17. EPA – Environmental Protection Agency
18. FM – FM Global
19. IAPMO – International Association of Plumbing and Mechanical Officials
20. GAMA – Gas Appliance Manufacturers Association
21. HI – Hydraulic Institute Standards
22. ISO – International Organization for Standardization
23. MSS – Manufacturers Standardization Society
24. NEC – National Electric Code
25. NEMA – National Electrical Manufacturers Association
26. NFGC – National Fuel Gas Code
27. NFPA – National Fire Protection Association
28. NRCA – National Roofing Contractors Association
29. NSF – National Sanitation Foundation

30. OSHA – Occupational Safety and Health Administration
31. SMACNA – Sheet Metal and Air Conditioning Contractors' National Association, Inc.
32. TEMA – Tubular Exchanger Manufacturers Association
33. TIMA – Thermal Insulation Manufacturers Association
34. UL – Underwriters Laboratories Inc.

D. See Division 22, Plumbing individual Sections for additional references.

1.04 SUBMITTALS

A. See Division 01, General Requirements for Submittal Procedures as well as specific individual Division 22, Plumbing Sections.

B. Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.

C. In addition:

1. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.
2. Provide product submittals and shop drawings in electronic format only. For electronic format, provide one file per division containing one bookmarked PDF file with each bookmark corresponding to each Specification Section. Arrange bookmarks in ascending order of Specification Section number. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. All transmissions/submissions to be submitted to Architect. Deviations will be returned without review.
3. Product Data: Provide Manufacturer's descriptive literature for products specified in Division 22, Plumbing Sections.
4. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the Specifications and Drawings.

    a. Label submittal to match numbering/references as shown in Contract Documents and schedules. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.
    b. Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference Division 22, Plumbing Sections for specific items required in product data submittal outside of these requirements.

c. Provide pump curves, operation characteristics, capacities, ambient noise criteria, etc. for equipment.
d. For vibration isolation of equipment, list make and model selected with operating load and deflection. Indicate frame type where required. Submit manufacturer's product data.
e. See Division 22, Plumbing Sections for additional submittal requirements outside of these requirements.

5. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items. Incomplete submittal packages/submittals will be returned to Contractor without review.
6. Resubmission Requirements: Make corrections or changes in submittals as required, and in consideration of Engineer’s comments. Identify Engineer’s comments and provide an individual response to each of the Engineer’s comments. Cloud changes in the submittals and further identify changes which are in response to Engineer’s comments.
7. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support. Indicate manufacturer's installation and support requirements to meet ASCE 7-16 requirements for non-structural components. Provide engineered seismic drawings and equipment seismic certification. Equipment Importance Factor as specified in Division 01, Structural drawings and specifications.
8. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 22, Plumbing Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.
9. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
10. Substitutions and Variation from Basis of Design:

    a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
    b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid, including resulting charges for work performed under other Divisions, will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.

11. Shop Drawings: Provide coordinated Shop Drawings which include physical characteristics of all systems, equipment and piping layout plans, and control wiring diagrams. Reference individual Division 22, Plumbing Sections for additional requirements for Shop Drawings outside of these requirements.

a. Provide Shop Drawings indicating sanitary and storm cleanout locations and type to Architect for approval prior to installation.
b. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.

12. Samples: Provide samples when requested by individual Sections.
13. Resubmission Requirements:

a. Make any corrections or change in submittals when required. Provide submittals as specified. The Engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.

1) Resubmit for review until review indicates no exception taken or "make corrections as noted".
2) When submitting drawings for Engineer's re-review, clearly indicate changes on drawings and "cloud" any revisions. Submit a list describing each change.

14. Operation and Maintenance Manuals, Owner's Instructions:

a. Submit, at one time, one bound copy and electronic files (PDF format) of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Include valve charts. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.

1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.
2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment: belts, motors, lubricants, and filters.
3) Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub assemblies.
4) Include copy of startup and test reports specific to each piece of equipment.
5) Include copy of final water systems balancing log along with pump operating data.
6) Include commissioning reports.
7) Include copy of pressure, flow, leakage and purity test data and water systems test data, as applicable.
8) Include copy of valve charts/schedules.
9) Include Warranty per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

10) Include product certificates of warranties and guarantees.
11) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.

b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 22 00 00, Plumbing Basic Requirements article titled "Demonstration".
c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

15. Record Drawings:

a. Maintain at site at least one set of drawings for recording “As-constructed” conditions. Indicate on Drawings changes to original documents by referencing revision document, and include buried elements, location of cleanouts, and location of concealed mechanical items. Include items changed by field orders, supplemental instructions, and constructed conditions.
b. Record Drawings are to include equipment and fixture/connection schedules that accurately reflect "as constructed or installed" for Project.
c. At completion of project, input changes to original project on CAD Drawings and make one set of black-line drawings created from CAD Files in version/release equal to contract drawings. Submit CAD Files and drawings upon substantial completion.
d. At completion of project, show changes and deviations from the Drawings in red on one set of black-line drawings. Include written Addendums, RFIs, and change order items. Make changes to Drawings in a neat, clean, and legible manner.
e. Provide Invert elevations and dimensioned locations for water services, building waste, and storm drainage piping below grade extending to 5-feet outside building line.
f. See Division 22, Plumbing individual Sections for additional items to include in record drawings.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Work and materials installed to conform with all local, State and Federal codes, and other applicable laws and regulations. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.

B. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

C. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturers equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., piping) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.

D. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

E. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.

F. Provide products that are UL listed.

G. Piping Insulation products to contain less than 0.1 percent by weight PBDE in all insulating materials.

H. All potable water system components, devices, material, or equipment containing a weighted average of greater than 0.25 percent lead are prohibited, and shall be certified in accordance with current editions of the Safe Drinking Water Act (SDWA), NSF 61 & NSF 372. Endpoint devices used to dispense water for drinking shall meet the requirements of NSF 61.

I. ASME Compliance: ASME listed water heaters and boilers with an input of 200,000 BTUH and higher, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by code or local jurisdiction.

J. Provide safety controls required by National Boiler Code (ASME CSD 1) for boilers and water heaters with an input of 400,000 BTUH and higher.

1.06 WARRANTY

A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Contracting and Procurement Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty in Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

1.07 COORDINATION DOCUMENTS

A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, plumbing equipment/fixtures, fire sprinklers, plumbing, cable trays, lights, and electrical services with architectural and structural requirements, and other trades (including ceiling suspension, and tile systems), and provide maintenance access requirements.

Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.

B. Advise Architect in the event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

C. Submit final Coordination Drawings with changes as As-Built Drawings at completion of project.

1.08 WORK INCLUDED

A. Furnish and install sleeves, inserts and anchorage required for the installation, which are embedded in work of other trades. Sleeve, wrap and seal piping in concrete.

B. Electrical: For plumbing trim/devices/equipment, provide, from the line voltage connection by Division 26, the low voltage electrical connections and wiring as required for complete and operable system. Includes, but is not limited to: Low voltage electrical raceway, wiring and accessories, such as step-down transformers as necessary for function of sensors and automatic valve and faucet controls. Supply step-down transformers and size wiring as recommended by manufacturer of plumbing trim/faucets requiring electrical low voltage connection.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer, including but not limited to fixtures, pumps, drains and equipment.

2.02 STANDARDS OF MATERIALS AND WORKMANSHIP

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL listed and labeled or be approved by State, County, and City authorities prior to procurement and installation.

B. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

C. Hazardous Materials:

1. Comply with local, State of Washington, and Federal regulations relating to hazardous materials.
2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.

3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.

PART 3 - EXECUTION

3.01 ACCESSIBILITY AND INSTALLATION

A. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Install equipment requiring access (i.e., drain pans, drains, control operators, valves, motors, cleanouts and water heaters) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles or crawlspaces which would impede or block intended usage.

C. Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing, and coordination with other trades and disciplines.

D. Earthwork:

1. Confirm Earthwork requirements in Contract Documents. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

    a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with the provisions of related earthwork Sections/divisions. Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.
    b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.
    c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

E. Firestopping:

1. Confirm Firestopping requirements in Division 07, Thermal and Moisture Protection. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

    a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping, ductwork and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements

of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

F. Pipe Installation:

1. Provide installation of piping systems coordinated to account for expansion and contraction of piping materials and building as well as anticipated settlement or shrinkage of building. Install work to prevent damage to piping, equipment, and building and its contents. Provide piping offsets, loops, expansion joints, sleeves, anchors or other means to control pipe movement and minimize forces on piping. Verify anticipated settlement and/or shrinkage of building with Project Structural Engineer. Verify construction phasing, type of building construction products and rating for coordinating installation of piping systems.
2. Include provisions for servicing and removal of equipment without dismantling piping.

G. Plenums:

1. Provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.

3.02 SEISMIC CONTROL

A. Confirm Seismic Control requirements in Division 01, General Requirements, Structural documents, and individual Division 22 Plumbing Sections.

B. General:

1. Earthquake resistant designs for Plumbing (Division 22) equipment and distribution, i.e. motors, plumbing systems, piping, equipment, water heaters, boilers, etc. to conform to regulations of jurisdiction having authority.
2. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.
3. Provide stamped Shop Drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for piping equipment and water heaters. Submit Shop Drawings along with equipment submittals.
4. Provide stamped Shop Drawings from licensed Structural Engineer of seismic flexible joints for piping and crossing building expansion or seismic joints. Submit Shop Drawings along with seismic bracing details.

C. Piping:

1. Per "Seismic Restraints Manual Guidelines for Mechanical Systems" latest edition published by SMACNA or local requirements.

D. Provide means to prohibit excessive motion of plumbing equipment during earthquake.

3.03 REVIEW AND OBSERVATION

A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:

1. Underground piping installation prior to backfilling.
2. Prior to covering walls.
3. Prior to ceiling cover/installation.
4. When main systems, or portions of, are being tested and ready for inspection by AHJ.

C. Bear responsibility and cost to make piping accessible, to expose concealed lines, or to demonstrate acceptability of the system. If Contractor fails to notify Architect at times prescribed above, costs incurred by removal of such work are the responsibility of the Contractor.

D. Final Punch:

1. Prior to requesting a final punch visit from the Engineer, request from Engineer the Plumbing Precloseout Checklist, complete the checklist confirming completion of systems' installation, and return to Engineer. Request a final punch visit from the Engineer, upon Engineer's acceptance that the plumbing systems are ready for final punch.
2. Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

3.04 CUTTING AND PATCHING

A. Confirm Cutting and Patching requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

1. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to Project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).
2. Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section will be performed by skilled craftspeople of each respective trade in conformance with appropriate Division of Work.
3. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.
4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and

painting walls, ceilings, etc. where existing piping and devices are removed as part of this project. Where alterations disturb lawns, paving, and walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.

5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

3.05 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

3.06 DELIVERY, STORAGE AND HANDLING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust. Insulation and lining that becomes wet from improper storage and handling to be replaced before installation. Products and/or materials that become damaged due to water, dirt and/or dust as a result of improper storage to be replaced before installation.
2. Protect equipment and pipe to avoid damage. Close pipe openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.
3. Protect bright finished shafts, bearing housings and similar items until in service.

3.07 DEMONSTRATION

A. Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Upon completion of work and adjustment of equipment and test systems, demonstrate to Owner's Authorized Representative, Architect and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

C. Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

3.08 CLEANING

A. Confirm cleaning requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

3.09 INSTALLATION

A. Confirm installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Install equipment and fixtures in accordance with manufacturer's installation instructions, plumb and level and firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.

C. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

1. Do not place equipment in sustained operation prior to initial balancing of plumbing systems.
2. Provide pump impellers to obtain Basis of Design design capacities.

D. Provide miscellaneous supports/metals required for installation of equipment and piping.

3.10 PAINTING

A. Confirm requirements in Division 01, General Requirements and Division 09, Finishes. In absence of specific requirements, comply with individual Division 22, Plumbing Sections and the following:

1. Ferrous Metal: After completion of plumbing work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces, i.e., hangers, hanger rods, equipment stands, with one coat of black asphalt for exterior or black enamel for interior, suitable for hot surfaces.
2. In a mechanical room, on roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.
3. See individual equipment Specifications for other painting.
4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.
5. Piping: Clean, primer coat and paint exposed piping on roof or at other exterior locations with two coats paint suitable for metallic surfaces and exterior exposures. Color selected by Architect.

6. Covers: Covers such as manholes, cleanouts and the like will be furnished with finishes which resist corrosion and rust.

3.11 DEMOLITION

A. Confirm Demolition requirements in Division 01, General Requirements and Division 02, Existing Conditions. In absence of specific requirements, comply with individual Sections in Division 22, Plumbing and the following:

1. Scope:

   a. It is the intent of these documents to provide necessary information and adjustments to plumbing system required to meet code, and accommodate installation of new work.
   b. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas.
   c. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve underground utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.

2. Equipment: Unless otherwise directed, equipment, fixtures, or fittings being removed as part of demolition process are Owner's property. Remove other items not scheduled to be reused or relocated from job site as directed by Owner.
3. Unless specifically indicated on Drawings, remove exposed, unused piping to behind finished surfaces (floor, walls, ceilings, etc.). Cap piping and patch surfaces to match surrounding finish.
4. Unless specifically indicated on Drawings, remove unused equipment, fixtures, fittings, rough-ins, and connectors. Removal is to be to a point behind finished surfaces (floors, walls, and ceilings).

3.12 ACCEPTANCE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Sections in Division 22, Plumbing and the following:

1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:

   a. Testing and Balancing Reports
   b. Cleaning
   c. Operation and Maintenance Manuals
   d. Training of Operating Personnel
   e. Record Drawings
   f. Warranty and Guaranty Certificates
   g. Start-up/Test Document and Commissioning Reports

3.13 FIELD QUALITY CONTROL

A. Confirm Field Quality Control requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 22 00 00, Plumbing Basic Requirements and individual Division 22, Plumbing Sections.

B. Tests:

1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in operation and maintenance manuals.
2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

3.14 ELECTRICAL INTERLOCKS

A. Where equipment motors are to be electrically interlocked with other equipment for simultaneous operation, utilize plumbing equipment wiring diagrams to coordinate with electrical systems so that proper wiring of equipment involved is affected.

END OF SECTION

SECTION 220519 – PLUMBING DEVICES

PART 1 - GENERAL – NOT USED

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Pressure Gauges:

1. Dwyer Instruments, Inc.
2. Moeller Instrument Co., Inc.
3. Omega Engineering, Inc.
4. Trerice
5. Or approved equivalent.

B. Thermometers:

1. Ashcroft
2. Trerice
3. Weiss
4. Marshaltown
5. Weksler
6. Or approved equivalent.

C. Water Hammer Arrestors (Shock Absorbers):

1. Bellows Type:

a. Amtrol
b. J.R. Smith
c. MIFAB
d. Wade
e. Zurn
f. Or approved equivalent.

2. Piston Type:

a. MIFAB
b. PPP
c. Sioux Chief
d. Or approved equivalent.

D. Trap Primers:

1. J.R. Smith
2. MIFAB
3. PPP

4. Wade
5. Zurn
6. Or approved equivalent.

2.02 PRESSURE GAUGES

A. Pressure Gauges: ASME B40.100, phosphor-bronze bourdon type, dry type.

1. Case: Cast aluminum, stem-mounted, flange less.
2. Size: 4-1/2-inch diameter.
3. Window: Clear glass.
4. Connector: Brass.
5. Scale: White aluminum with black graduation and markings.
6. Pointer: Black, adjustable.
7. Mid-Scale Accuracy: One percent.
8. Scale: PSI and KPa.
9. Basis of Design: Trerice Model 600CB.

2.03 THERMOMETERS

A. Thermometers – Adjustable Angle: Red or blue appearing organic liquid in glass, ASTM E 1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.

1. Size: 9-inch scale.
2. Window: Acrylic.
3. Scale: Aluminum, white background, black graduations and markings.
4. Stem: 3/4-inch NPT brass (aluminum for installation in air ducts).
5. Accuracy: 2 percent, per ASTM E 77.
6. Calibration: 0-160 with 2 Degrees F graduations.
7. Basis of Design: Trerice BX9.

2.04 WATER HAMMER ARRESTORS (SHOCK ABSORBERS)

A. Bellows-type, stainless steel casing and bellows, pressure rated, tested and certified in accordance with PDI WH-201 or ASSE 1010.

B. Piston-type, copper, brass or stainless steel with O-ring piston, pressure rated, tested and certified in accordance with PDI WH-201 or ASSE 1010.

2.05 TRAP PRIMERS

A. Automatic trap primer assemblies meeting governing code requirements. Provide with air-gap fittings as required.

B. Trap seal primer valve (low lead) with integral automatic anti-siphon protection. The priming valve to discharge on both pressure drop and pressure spike. PPP CPO 500.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. For plumbing devices requiring access from access panels (i.e. trap primers, water hammer arrestors and the like) submit location/size of all access panels to Architect for approval prior to purchase and installation of access panel. See Section 22 00 00, Plumbing Basic Requirements for additional requirements.

B. Provide instruments with scale ranges selected according to service with largest appropriate scale.

C. Install per manufacturer recommendations.

END OF SECTION

SECTION 220523 – GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Quality assurance as required by Section 220000, Plumbing Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. NSF 61, Annex G and/or NSF/ANSI 372 for potable water services. Valves must be 3rd-party certified.
2. ISO 9001 Certified.
3. IAPMO Certified for Low Lead.

C. Source Limitations for Valves: Obtain each type of valve from a single source and from a single manufacturer.

D. Model numbers indicated as Basis-of-Design indicate valve characteristics. All valves are to meet code Low Lead/Lead Free Standards.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Source Limitations for Valves: Obtain each type of valve from a single source and from a single manufacturer.

B. Valves, General:

1. Apollo
2. Armstrong
3. ASCO
4. Caleffi
5. Cla-Val
6. Conbraco
7. Crane
8. Clow
9. Griswold
10. Hammond
11. Hays
12. Jenkins
13. Josam
14. Kennedy
15. Milwaukee

16. Mueller
17. Nibco
18. Red-White Valve
19. Smith
20. Stockham
21. Tour Anderson
22. Wade
23. Watts
24. Wilkins
25. Zurn
26. Or approved equivalent.

C. Swing Check Valves:

1. See Valves General above.

2.02 VALVES – GENERAL

A. General:

1. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.
2. Operators: Provide handwheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves 6-inches and smaller.
3. Valve Identification: Manufacturer's name (or trademark) and pressure rating clearly marked on valve body.

B. Valves in Insulated Piping: With 2-inch stem extension and following features:

1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation on valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied.

C. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Solder Joint: With sockets according to ASME B16.18.
3. Threaded: With thread according to ASME B1.20.1.

D. Valve Bypass and Drain Connections: MSS SP-45.

E. Building Service:

1. Shutoff and Isolation Valves:

a. Pipe Sizes 3-inches and Smaller: Ball Valve.

2. Drain Service: Ball Valves.
3. Strainer Blow-Off: Ball Valve.
4. Check Valves: Swing.

2.03 BALL VALVES

A. All ball valves on brazed piping are to be three-piece.

B. 2-1/2 Inches and Smaller: MSS SP-110, 400-600 PSI, two-piece full port ball configuration, bronze body, extended soldered ends for copper pipe and threaded ends for iron pipe, lead-free brass or stainless steel ball, lead-free brass stem, Teflon seat, extended steel handle. Apollo 77CLF 100 Series two-piece.

2.04 SWING CHECK VALVES

A. 2-inches and Smaller: Class 125, bronze body, horizontal swing, regrinding type, Y-pattern, renewable disc. Nibco 413. MSS SP-80.

2.05 BACKFLOW PREVENTION ASSEMBLIES

A. General: Assemblies model numbers listed below are for general comparison. Project specific model numbers to be verified contractor as approved by jurisdiction where project is located.

B. Reduced Pressure Zone Backflow Preventer (RPBP) for High Hazard Applications:

1. 2-inches and Smaller: Assembly consists of shutoff ball valves in inlet and outlet, and strainer on inlet. Assemblies include test cocks and pressure-differential relief valve located between two positive seating check valves and comply with requirements of ASSE Standard 1013 and AWWA C511. Bronze construction, threaded ends, stainless steel internal parts, FDA strainer, and air gap fitting. Route pipe from air gap fitting to approved waste receptor.

2.06 PRESSURE REGULATING VALVE-DOMESTIC WATER

A. Water: Bronze body, diaphragm or piston type, spring actuated, with separate or integral stainless steel strainer, pressure range to suit conditions, approved for potable water use, low lead. Provide shutoff valves, pressure relief valves, unions, drain valve and bypass.

B. Water: Automatic control pressure regulating valve, stainless steel seat, stem and spring, diaphragm actuated with brass body, hydraulic control pilots with effluent operating temperature range 32 degrees F to 180 degrees F, FDA and AWWA approved.

C. Water: Bronze body construction, stainless steel strainer screen, thermal expansion bypass with renewable stainless steel seat and high temperature resisting diaphragm.

2.07 THERMOSTATIC POINT-OF-USE MIXING VALVES (ASSE 1070 RATED)

A. Thermostatic type with bronze body construction, corrosion resistant materials, union end stops, check inlets with strainers, 0-200 degree F dial thermometer and discharge shut-off valve. Mixing valves to meet ASSE 1070.

B. Maximum required delta temperature differential between hot water supply temperature and delivery temperature is 15 degrees F. Set valve outlet temperature per drawing requirements.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set ball valves open to minimize exposure of functional surfaces.
4. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Inspect the shipping container before unpacking to look for damage that could have occurred during transport, and report it to the transportation company immediately. After visual inspection, remove the valve from the shipping container. Make sure the faces are free of any scratches and that there is not any obvious damage to the actuator assembly or valve body.

D. Make sure to note the valve's model number during the unpacking process. The model number will need to be provided when purchasing replacement parts.

E. Purge and clean all piping to be connected to valve.

F. Install per manufacturer's recommendations.

G. Determine that the valve and its plumbing piping is adequately supported when installed. If a valve is not adequately supported, this could prevent the valve from operating and sealing correctly. Be sure that all mating flanges are in line and parallel to minimize straining on joints and valve body.

H. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

I. Do not attempt to repair defective valves; replace with new valves.

J. Install valves where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

K. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Install valve drains with

hose end adapter and cap on chain for each valve that must be installed with stem below horizontal plane. Ensure installation provides full stem movement.

L. Insulation: Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.

M. Seats: Renewable seats, except where otherwise indicated.

N. When soldering, use paste flux that are approved by the manufacturer for use with lead free alloys.

O. If valve applications are not indicated on Drawings, use the following:

1. Shutoff Service: Ball valves.

P. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

Q. Valve Adjusting and Cleaning:

1. Inspect valves for leaks. Adjust or replace packing to stop leaks. Replace valve if leak persists.
2. Valve Identification. Tag valves per Section 22 05 53, Identification for Plumbing Piping and Equipment.

3.02 BACKFLOW PREVENTION ASSEMBLIES

A. See General Installation Requirements above.

B. Install where indicated, and where required by code. Where practical, locate in same room as equipment being protected.

C. Submit product cut sheets to local AHJ for approval prior to purchase and installation.

D. Install as close to wall as possible with clearances for access and maintenance as required by AHJ.

E. Coordinate exact location of installation and type of backflow device serving a particular piece of equipment with AHJ and Architect prior to purchase and installation.

F. Provide wall/floor brackets that are of fully welded, hot dipped galvanized construction, fabricated to meet field conditions. Mount backflow preventer to brackets using cadmium plated "U" type bolts and nuts.

G. Contact local water district/backflow specialist and request backflow installation requirements. Install backflow devices per UPC and local water district/backflow specialist requirements.

H. Route waste piping from air gap waste fitting concealed within walls to point of air gap termination at indirect waste receptor.

I. Follow local codes for installation requirements. Pipe lines should be thoroughly flushed to remove foreign material before installing the unit. Provide a strainer ahead of backflow preventer to prevent disc from unnecessary fouling. Install valve in line with arrow on valve body pointing in the direction of flow. It is important that the valve be easily accessible to facilitate testing and servicing. Do not install in a concealed location.

END OF SECTION

SECTION 220529 – HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 REFERENCES AND STANDARDS

A. In addition, meet the following:

1. ASCE 7-16, Minimum Design Loads for Buildings and Other Structures.
2. Hanger spacing installation and attachment to meet all manufacturer's requirements and MSS SP-58.
3. Terminology: As defined in MSS SP-90 "Guidelines on Terminology for Pipe Hangers and Supports".
4. Install piping per SMACNA's requirements.

1.02 PERFORMANCE REQUIREMENTS

A. General – Provide pipe and equipment hangers and supports in accordance with the following:

1. When supports, anchorages, and seismic restraints for equipment, and supports, anchorages, and seismic restraints for piping are not shown on the Drawings, the contractor is responsible for their design.
2. Connections to structural framing are not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

B. Engineered Support Systems:

1. Support frames such as pipe racks or stanchions for piping and equipment which provide support from below.
2. Equipment and piping support frame anchorage to supporting slab or structure.

C. Provide channel support systems, for piping to support multiple pipes capable of supporting the combined weight of supported systems, system contents and test water.

D. Provide heavy-duty steel trapezes for piping to support multiple pipes capable of supporting the combined weight of supported systems, system contents and test water.

E. Provide seismic restraint hangers and supports for piping and equipment.

F. Obtain approval from AHJ for seismic restraint hanger and support system to be installed for piping and equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Pipe Hangers and Supports for Plumbing Piping and Equipment:

1. Pipe Hangers/Supports:

a. B-Line Systems Inc.
b. Anvil International
c. HOLDRITE
d. Erico Co. Inc.
e. Snappitz Thermal Pipe Shield Manufacturing
f. Rilco Manufacturing Co. Inc.
g. Nelsen-Olson Inc.
h. Or approved equivalent.

2. Channel Support Systems:

a. B-Line Systems Inc.
b. Anvil International, Anvit-Strut
c. Erico Hanger Co. Inc.; O-Strut Div.
d. Unistrut Corp.
e. HOLDRITE EZ-Strut Systems
f. Or approved equivalent.

B. Wall and Floor Sleeves:

1. Below Grade and High Water Table Areas:

a. Modular Link Sealing System at Pipe Sleeves:

1) Thunderline Corporation
2) Or approved equivalent.

2. Pre-Engineered Firestop Pipe Penetration Systems:

a. HOLDRITE HydroFlame
b. Proset
c. Or approved equivalent.

C. Building Attachments:

1. Anchor-It
2. Gunnebo Fastening Corp.
3. ITW Ramset / Red Head
4. Masterset Fastening Systems, Inc.
5. Or approved equivalent.

D. Flashing:

1. Fastenal
2. Or approved equivalent.

E. Miscellaneous Metal and Materials:

1. See Miscellaneous Metal and Materials article below.
2. Powder-Actuated Fastener Systems:

    a. Gunnebo Fastening Corp.
    b. Hilti, Inc.
    c. ITW Ramset / Red Head
    d. Masterset Fastening Systems, Inc.
    e. Or approved equivalent.

2.02 PIPE HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

A. Horizontal Piping Hangers and Supports – Horizontal and Vertical Piping, and Hanger Rod Attachments:

1. Factory fabricated horizontal piping hangers and supports to suit piping systems in accordance manufacturer's published product information.
2. Use only one type by one manufacturer for each piping service.
3. Select size of hangers and supports to exactly fit pipe size for bare piping and to exactly fit around piping insulation with saddle or shield for insulated piping.
4. Provide copper-plated hangers and supports for uninsulated copper piping systems.
5. Provide padded pipe hangers, clamps and supports for thermoplastic piping system.
6. Install no hub cast iron pipe and fittings per CISPI 301-09 Installation Procedures for Hubless Cast Iron Pipe and Fittings for Sanitary and Storm Drain Waste and Vent Piping Applications. Brace hubless cast iron pipe and fittings 5-inch and larger with HOLDRITE No Hub Pipe Restraints or approved equivalent.

B. Pipe Hangers, Guides and Channel Systems:

1. Hanger Rods: Hanger rods continuously threaded or threaded ends only in concealed spaces and threaded ends only in exposed spaces; finish electro-galvanized or cadmium-plated in concealed spaces and prime painted in exposed spaces; sizes per MSS.
2. Pipe Rings for Hanger Rods: Pipe sizes 2-inch and smaller, MSS SP Type 6 or Type 10, or approved equivalent. Pipe sizes 2-1/2-inches and larger, clevis type hangers with adjustable nuts on rod. MSS SP Type 1. Pipe rings to have same finish as hanger rods.

C. Beam Clamps:

1. MSS Type 19 and 23, wide throat, with retaining clip.
2. Universal Side Beam Clamp: MSS Type 20.

D. Below Ground:

1. Pipe Hangers: Adjustable Clevis type, Federal Specification WW-H-171 (Type 1), UL listed, stainless steel Type 316. MSS Type 1. If PVC piping to be used, provide Type 1 hanger, coated for PVC piping.

2. Rod: 5/8-inch stainless steel Type 316.
3. Eyebolt: Stainless steel Type 316.
4. Nuts and Washers: Stainless steel Type 316.

E. Hangers for Pipe Size 2-inches and Smaller:

1. Adjustable swivel ring hanger, UL listed, Type 6 or Type 10.

F. Hangers for Pipe Size 2-1/2-inches and Larger:

1. Adjustable clevis type, UL listed, Type 1.

G. Riser Clamps:

1. Steel, UL listed. MSS Type 8.

H. Plumbers Tape:

1. Not permitted as pipe hangers or pipe straps.

I. Pipe Alignment and Secondary Support Systems:

1. Secondary Pipe supports for general applications (Non-Acoustical).

a. Supports will be manufactured in compliance with IAPMO Product Standard PS 42-96. All products provided will be listed by IAPMO for secondary pipe support.
b. Supports may be used when sound and/or vibration transfer is not a concern.

2.03 WALL AND FLOOR SLEEVES

A. Below Grade and High Water Table Areas:

1. Modular Link Sealing System at Pipe Sleeves: Neoprene gasket links bolted together around an interior sleeve forming a watertight seal. Use a modular link sealing system at sleeves to continuously fill the annular space between the pipe and the wall opening. Provide Link-seal Type C unless otherwise noted. OS with S-316 stainless construction for continuous water/tank walls.
2. Sleeves through concrete foundation walls and floors. Ductile iron pipe. Class 50 or 51 pipe conforming to ANSI/AWWA C151/A21.51. Pipe sleeve will extend a minimum of 6-inches beyond outside perimeter of foundation. Final placement of sleeve will be confirmed with project's structural engineer. In areas with a high water table, provide AWWA C900, Class 235 plastic pipe in lieu of ductile iron pipe.

B. Pre-Engineered Firestop Pipe Penetration Systems: UL listed assemblies for maintaining fire rating of piping penetrations through fire-rated assemblies. Comply with ASTM E814.

C. Insulating Caulking: Eagle or Pitcher Super 66 high temperature cement.

2.04 BUILDING ATTACHMENTS

A. General: Anchor supports to existing masonry, block and tile walls per anchoring system manufacturer's recommendations or as modified by project Structural Engineer. Provide anchor bolts suitable for cracked concrete.

B. Anchor Bolts:

1. Anchor Bolts (Cast-In-Place): Steel bolts, ASTM A307. Nuts to conform to ASTM A194. Design values for shear and tension not more than 80 percent of the allowable listed loads.
2. Anchor (Expansion) Bolts: Carbon steel to ASTM A307; nut to conform to ASTM A194; drilled-in type. Design values for shear and tension not more than 80 percent of the allowable listed loads.
3. Anchor (Adhesive) Bolts: Consisting of two-part adhesive cartridge and zinc-plated Type A307 steel anchor bolt rod assembly with ASTM A194 nut.

C. Beam Clamps:

1. MSS Type 19 and 23, wide throat, with retaining clip.
2. Universal Side Beam Clamp: MSS Type 20.

D. Grout: ASTM C1107, Grade B, factory mixed and packaged, non-shrink and nonmetallic, dry, hydraulic-cement grout.

1. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
2. Properties: Non-staining, noncorrosive, and non-gaseous.
3. Design Mix: 5000-PSI (34.5-MPa), 28-day compressive strength.

2.05 FLASHING

A. Steel Flashing: 26 gauge galvanized steel.

B. Safes: 8 mil thick neoprene.

C. Caps: Steel, 22 gauge minimum, 16 gauge at fire-resistant structures.

D. Provide hot dipped galvanized components for items exposed to weather.

2.06 MISCELLANEOUS METAL AND MATERIALS

A. Miscellaneous Metal: Provide miscellaneous metal items specified hereunder, including materials, fabrication, fastenings and accessories required for finished installation, where indicated on Drawings or otherwise not shown on drawings, that are necessary for completion of the project. The Contractor is responsible for their design.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Examination:

1. Verify building materials to have hangers and attachments affixed in accordance with hangers to be used. Provide supporting calculations.

B. Preparation:

1. Examine Drawings and coordinate for verification of exact locations of fire and smoke rated walls, partitions, floors and other assemblies. Indicate, by shading and labeling on Record Drawings such locations and label as "1-Hour Wall," "2-Hour Fire/Smoke Barrier," and the like. Determine proper locations for piping penetrations. Set sleeves in place in new floors, walls or roofs prior to concrete pour or grouting.

C. Install hangers, supports, anchors and sleeves after required building structural work has been completed in areas where the work is to be installed. Coordinate with project structural engineer proper placement of inserts, anchors and other building structural attachments.

END OF SECTION

SECTION 220533 – HEAT TRACING FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 REFERENCES AND STANDARDS

A. In addition, meet the following:

1. UL 718K Pipe Heating Cable.
2. CSA Design 3A, 3B, 3C.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Heat Trace Cable (Freeze Protection):

1. FLX by Thermon
2. SRF by Chomalox
3. XL-Trace by Raychem
4. CLT by Nelson
5. Or approved equivalent.

2.02 HEAT TRACE CABLE (FREEZE PROTECTION)

A. General: Provide complete UL listed system of heating cables and components listed specifically for maintaining pipe temperature over entire piping system exposed to freezing temperatures.

B. Materials:

1. Cable: Self-regulating flat, flexible, low-heat density, parallel electric heater strip consisting of 2 stranded circuit conductors enclosed in semi-conductive, polymer core insulated with plastic jacket protected with tinned-copper braid. Ability to overlapped without creating hot spots and is suitable for application on plastic, copper or steel pipe.
2. Voltage: See electrical drawings. Provide power connections, end seals, splices tap-offs and tees for a complete system.
3. Controls: Thermostat with fixed setpoint of 40 degrees F, remote bulb and capillary sensor enclosed in a NEMA 4 enclosure.

C. Minimum Exposure Temperature: 150 degrees F continuous.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. General: Installation to be by Division 26, Electrical.

3.02 HEAT TRACE CABLE (FREEZE PROTECTION)

A. Location: Furnish heat trace and components for piping exposed to freezing conditions.

B. Insulate piping systems after installation and testing of heating cable.

C. Install cable parallel to pipe or spiral wrap to achieve power density per linear foot of pipe to prevent freezing.

D. Heat Trace and Components are to be installed per the following:

1. Attach heat trace cable to pipe with polyester tape; increments not exceeding 1-foot.
2. Install thermostat capillary and bulb to pipe with polyester tape assuring a firm bulb contact with pipe. Install bulb without contact to heat cable. Maximum 12-inch spacing between tape.
3. Install thermostat at accessible location adjacent to pipe with minimum of exposed capillary.
4. Labeling: Provide “Electric Traced” label to outside of the pipes thermal insulation on alternating sides. Locate labels at intervals of 5 to 15-feet over entire length of heat tracing.
5. Coordinate installation with work under Division 26, Electrical for electrical service to each thermostat.
6. Coordinate application of heat tape with pipe insulation and weather jacketing.

END OF SECTION

SECTION 220553 – IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. In addition, meet the following:

1. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required.
2. Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices unless otherwise indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 22, Plumbing Sections. Where more than a single type is specified for application, provide single selection for each product category.

B. Plastic Nameplates:

1. Brady Corporation
2. Or approved equivalent.

C. Tags:

1. Brady Corporation
2. Brimar
3. Champion America Inc.
4. Craftmark
5. Seton Identification Products
6. Or approved equivalent.

D. Plastic Pipe Markers:

1. Brady Corporation
2. Brimar
3. Champion America Inc.
4. Craftmark
5. Seton Identification Products
6. Or approved equivalent.

2.02 PLASTIC NAMEPLATES

A. Description: Engraving stock melamine plastic laminate 1/8-inch thick, engraved with engraver's standard letter style of the sizes and wording indicated.

2.03 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2-inch diameter.

B. Metal Tags: Polished Brass with stamped letters; tag size minimum 1-1/2-inch diameter with smooth edges.

C. Valve designations to be coordinated with existing valve identifications to ensure no repetitive designations are utilized.

D. Chart/Schedules: Valve Schedule Frames. For each page of a valve schedule, provide glazed display frame with removable mounting as appropriate for wall construction upon which frame is to be mounted. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.

E. Valve Tag Fasteners: Solid brass chain (wire link or beaded type), or solid brass S-hooks.

F. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7-inches.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
4. Color: Yellow background with black lettering.

2.04 PLASTIC PIPE MARKERS

A. Color: Conform to ASME A13.1 and ANSI Z535.1.

B. Plastic Pipe Markers (for external diameters of 6-inches and larger including insulation): Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

C. Plastic Tape Pipe Markers (for external diameters less than 6-inches including insulation): Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Minimum information indicating flow direction arrow and identification of fluid being conveyed.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Lettering and Graphics:

1. General: Coordinate names, abbreviations and other designations used in plumbing identification work with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of mechanical systems and equipment.
2. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples: Chiller No. 3, Air Handling Unit No. 42, Standpipe F12, and the like).

B. Preparation: Degrease and clean surfaces to receive adhesive for identification materials.

C. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

D. Install valve schedule at each mechanical room.

E. Access Doors: Provide markers on each access door and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions.

END OF SECTION

SECTION 220593 – TESTING, ADJUSTING, AND BALANCING FOR PLUMBING

PART 1 - GENERAL

1.01 SUMMARY

A. Balancing water flow within distribution systems of all Division 22, Plumbing Sections, including sub-mains, branches, and terminals, to indicated quantities according to specified tolerances.

B. Adjusting plumbing systems to provide indicated quantities.

C. Verifying that automatic control devices are functioning properly.

D. Reporting results of the activities and procedures specified in this Section.

1.02 QUALITY ASSURANCE

A. In addition, meet the following:

1. Acceptable Balance Firm:

    a. General:

        1) Procure services of independent Testing, Adjusting, and Balancing (TAB) agency to balance, adjust and test water circulating. Minimum Experience: 5 years.

    b. Industry Standards: Testing and Balancing will conform to NEBB, American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), and American National Standards Institute (ANSI) as follows:

        1) NEBB: Comply with Procedural Standards for Testing, Adjusting Balancing of Environmental Systems.
        2) ASHRAE: Comply with recommendations pertaining to measurements, instruments, and TAB.

    c. Test Observation: If requested, conduct tests in the presence of the Architect or the Architect's representative.

2. Provide proof of testing agency having successfully completed at least five projects of similar size and scope.
3. Code Compliance: Perform tests in the presence of the Authority Having Jurisdiction (AHJ) where required by the Authority Having Jurisdiction (AHJ).
4. Owner Witness: Perform tests in the presence of the Owners representative.
5. Engineer Witness: The engineer or engineer's representative reserves the right to observe tests or selected tests to assure compliance with the specifications.

6. Simultaneous Testing: Test observations by the Authority Having Jurisdiction (AHJ), the Owner's Authorized Representative and the engineer's representative need not occur simultaneously.
7. Do not perform TAB work until plumbing equipment has been completely installed and is operating continuously as required.
8. Conduct TAB with clean filters in place. Clean strainers prior to performing TAB.
9. Agent Qualifications: Engage a TAB Agent certified by AABC or NEBB.

1.03 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, controls installers, and other mechanics to operate systems and equipment to support and assist TAB activities.

B. Notice: Provide 7 days advance notice for each test. Include scheduled test dates and times.

C. Perform TAB after leakage and pressure tests on piping distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PROJECT CONDITIONS

A. Non-Owner Occupancy: Complete balancing of building systems prior to Substantial Completion and owner occupancy.

3.02 GENERAL TESTING AND BALANCING PROCEDURES

A. Perform TAB procedures on each system according to the procedures contained in AABC national standards or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

B. Cut insulation for pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.

C. Mark equipment settings with paint or other suitable, permanent identification material, including control positions, valve indicators and similar controls and devices, to show final settings.

3.03 ADJUSTMENT TOLERANCES

A. Piping Systems: Adjust to within plus or minus 10 percent of design.

3.04 FINAL REPORT

A. General: Computer printout in letter-quality font, on standard bond paper, in 3-ring binder, tabulated and divided into Sections by tested and balanced systems.

B. Include a certification sheet in front of binder signed and sealed by the certified TAB engineer.

1. Include a list of the instruments used for procedures, along with proof of calibration.

C. Final Report Contents: In addition to the certified field report data, include the following:

1. Pump curves.
2. Field test reports prepared by system and equipment installers.
3. Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data.

D. General Report Data: In addition to the form titles and entries, include the following data in the final report, as applicable:

1. Title page.
2. Name and address of TAB Agent.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB Agent who certifies the report.
10. Summary of contents, including the following:

    a. Design versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

11. Nomenclature sheets for each item of equipment.
12. Notes to explain why certain final data in the body of reports vary from design values.

E. Pump Test Reports: For pumps, include the following data. Calculate impeller size by plotting the shutoff head on pump curves.

END OF SECTION

SECTION 220700 – PLUMBING INSULATION

PART 1 - GENERAL

1.01 REFERENCES AND STANDARDS

A. In addition, meet the following:

1. Piping insulation products to contain less than 0.1 percent by weight PBDE in all insulating materials.

1.02 SUBMITTALS

A. In addition, provide:

1. Installer qualifications.
2. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any) for each type of product indicated.
3. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets with requirements indicated. Include dates of tests.
4. Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.
5. Submit manufacturer's installation instructions.

1.03 QUALITY ASSURANCE

A. In addition, meet the following:

1. Formaldehyde Free: Should be third-party certified with UL Environment Validation.
2. Recycled Content: A minimum of 40 percent post-consumer recycled glass content certified and UL validated.
3. Low Emitting Materials: For all thermal and acoustical applications of Glass Mineral Wool Insulation products, provide materials complying with the testing and products requirements of UL GREENGUARD Gold Certification.
4. Installer to have minimum 5 years' experience in the business of installing insulation.

1.04 FIRE HAZARD CLASSIFICATION

A. Maximum fire hazard classification of the composite insulation construction as installed to be not more than a Flame Spread Index (FSI) of 25 and Smoke Developed Index (SDI) of 50 as tested by current edition of ASTM E84 (NFPA 255) method.

B. Test pipe insulation in accordance with requirements of current edition of UL "Pipe and Equipment Coverings".

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Type 1, Glass Wool Pipe Insulation:

1. Owens-Corning
2. Johns Manville
3. Or approved equivalent.

B. Type 2, Flexible Elastomeric Insulation:

1. Insulation:

a. Armacell LLC Armaflex
b. K-Flex
c. Or approved equivalent.

C. Type 7, ADA Accessible Lavatory/Sink Insulation Kit:

1. IPS/Truebro
2. McGuire/Pro-Wrap
3. Plumberex/Pro-Extreme
4. Brocar Trap Wrap
5. Or approved equivalent.

D. Accessories:

1. ITW Insulation Systems
2. Or approved equivalent.

E. Pipe Fitting Insulation Covers:

1. Zeston Johns Manville
2. ITW Insulation Systems
3. Or approved equivalent.

2.02 TYPE 1, GLASS WOOL PIPE INSULATION

A. Glass Fiber: ASTM C547 Type I and IV; rigid molded, noncombustible.

1. Thermal Conductivity Value: 0.27 BTU*in/(hr*sf*F) at 75 degrees F.
2. Maximum Service Temperature: 850 degrees F to 1000 degrees F.
3. Vapor Retarder Jacket: White Kraft paper reinforced with glass fiber and bonded to aluminum foil, with self-sealing longitudinal laps and butt strips or vapor barrier mastic.

2.03 TYPE 2, FLEXIBLE ELASTOMERIC INSULATION

A. Elastomeric Foam: ASTM C534; flexible, cellular elastomeric, molded or sheet.

1. Thermal Conductivity Value: 0.25 BTU*in/(hr*sf*F) at 75 degrees F.
2. Maximum Service Temperature of 220 degrees F.
3. Maximum Flame Spread: 25.
4. Maximum Smoke Developed: 50 (3/4-inch thick and below).
5. Connection: Waterproof vapor retarder adhesive as needed.
6. UV Protection: UV outdoor protective coating per manufacturer's requirements.

B. Glue: Contact adhesive specifically manufactured for cementing flexible elastomeric foam.

C. Paint: Nonhardening high elasticity type, specifically manufactured as a protective covering of flexible elastomeric foam insulation for prevention of degradation due to exposure to sunlight and weather.

2.04 TYPE 7, ADA ACCESSIBLE LAVATORY/SINK INSULATION KIT

A. P-traps, trap arms, tail pieces, hot water and cold water insulating guards meeting ASTM C1822. Molded closed cell insulation with vinyl cover and nylon fasteners, paintable. Provide accessories as required for complete installation covering all exposed waste piping, water piping, stops and supplies. Color white.

2.05 ACCESSORIES

A. Equipment Insulation Compounds: Provide adhesives, cement, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated.

B. Provide staples, bands, wire, wire netting, tape corner angles, anchors, stud pins and metal covers as recommended by insulation manufacturer for applications indicated. Accessories, i.e., adhesives, mastics, cements and tape to have same flame and smoke component ratings as insulation materials with which they are used. Shipping cartons to bear a label indicating that flame and smoke ratings do not exceed those listed above. Provide permanent treatment of jackets or facings to impart flame and smoke safety. Provide non-water soluble treatments. Provide UV protection recommended by manufacturer for outdoor installation.

2.06 PIPE FITTING INSULATION COVERS

A. PVC Plastic Fitting Covers: Schuller Zeston 2000, Knauf Proto Fitting or approved equivalent. One-piece molded type fitting covers and jacketing material, gloss white. Connections: Tacks; pressure sensitive color matching vinyl tape.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION INFORMATION

A. Verification of Conditions:

1. Do not apply insulation until pressure testing and inspection of piping has been completed.
2. Examine areas and conditions under which insulation will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Preparation: Clean and dry surfaces to be insulated.

C. Installation:

1. Insulation: Continuous through walls, floors, and partitions except where noted otherwise.
2. Piping and Equipment:

a. Install insulation over clean, dry surfaces with adjoining sections firmly butted together and covering surfaces. Fill voids and holes. Seal raw edges. Install insulation in a manner such that insulation may be split, removed, and reinstalled with vapor barrier tape on strainer caps and unions. Do not install insulation until piping has been leak tested and has passed such tests. Do not insulate manholes, equipment manufacturer's nameplates, handholes, and ASME stamps. Provide beveled edge at such insulation interruptions. Repair voids or tears.

D. Protection and Replacement: Protect installed insulation during construction. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

E. Labeling and Marking: Provide labels, arrows and color coding on piping. Attach labels and flow direction arrows to jacketing per Section 22 05 53, Identification for Plumbing Piping and Equipment.

F. Insulation Shields: Provide hangers and shields (18 gauge minimum) outside of insulation for cold piping (<60 degrees F). Hot water piping hangers may penetrate insulation to contact pipe directly. Provide 18-inch long, noncompressible insulation section at insulation shields for lines 1-1/2-inches and larger (hot and cold piping).

G. Piping Surfaces to be Insulated:

Item to be Insulated	System Insulation Type	Pipe Size	Insulation Thickness
Hot Water Piping Above Grade (105F to 140F)	1	Runouts =<1-1/4-inch (uncirculated branches located in partitions within conditioned spaces) Mains =<1-1/4-inch Mains >1-1/4-inch	1-inch 1-inch 1-1/2-inch
Hot Water Circulation Piping Above Grade (105F to 140F)	1	Mains =<1-1/4-inch Mains >1-1/4-inch	1-inch 1-1/2-inch
Cold Water Piping Above Grade	1	=<1-1/2-inch >1-1/2-inch	1/2-inch 1-inch
ADA Accessible Lavatory/Sink	7	All	As Listed
Condensate Drain Piping	1, 2	All	1/2-inch

3.02 TYPE 7, ADA ACCESSIBLE LAVATORY/SINK INSULATION KIT

A. See General Installation Requirements above.

B. Install in accordance with manufacturer's instructions.

C. Provide lavatory/sink insulation kit. Install on waste fittings, hot and cold water stops and supplies.

END OF SECTION

SECTION 221000 – PLUMBING PIPING

PART 1 - GENERAL

1.01 REFERENCES AND STANDARDS

A. References and Standards as required by Section 22 00 00, Plumbing Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. NSF 61, Annex G.
2. Steel pipe to conform to ASTM and ANSI Standards as specified in this Section.
3. Copper piping to conform to ASTM B88, B306 and B208 and the standards of Copper Development Association (CDA), and American Welding Society, (AWS).
4. Cast Iron Piping to conform to standards of ASTM A-74, CISPI 301 and FM 1680.
5. Manufacturer's Standards Society (MSS) for valving and support reference standard.
6. American Water Works Association (AWWA) for Valving Assembly Standards.
7. American Society of Sanitation Engineers (ASSE) for Valving Standards.
8. American National Standards Institute (ANSI) for Piping Standards.
9. NFPA Standard 51B – “Fire Prevention in Use of Cutting and Welding Processes”.
10. Crosslinked polyethylene (PEX) pipe conforming to ASTM F876, F877 and CSA B1375, or DIN 16892 and 16893.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. See component manufacturers listed in individual articles below.

B. ADS

C. American-USA

D. Cerro

E. Charlotte

F. Clamp-All

G. Conbraco/Apollo Press

H. Elkhart

I. Enfield

J. Fuseseal

K. Gruvlok

L. Husky

M. Ideal

N. Mifab

O. Mission

P. Mueller

Q. Nibco

R. Orion

S. Shurjoint Mechanical Couplings

T. Sioux Chief

U. Spears

V. Tyler

W. Uponor

X. Viega

Y. Zurn

Z. Or approved equivalent.

AA. Firestopping Penetrations in Fire Rated Wall Floor Assemblies:

1. Hilti
2. Proset
3. Or approved equivalent.

2.02 GENERAL

A. Provide pipe, tube and fittings of the same type, fitting requirements, grade, class and the size and weight indicated or required for each service, as indicated in other Division 22, Plumbing Specifications. Where type, grade, or class is not indicated, provide proper selection as determined by installer for installation requirements, and comply with governing regulations and industry standards.

B. Manufactured materials delivered, new to the project site and stored in their original containers.

C. Product Marking: Furnish each item with legible markings indicating name brand and manufacturer, manufacturing process, heat number and markings as required per ASTM and UL/FM Standards.

2.03 SANITARY, DRAINAGE (RAIN/STORMWATER) DWV PIPING, BURIED WITHIN 5-FEET OF BUILDING

A. Cast Iron Pipe: ASTM A888/CISPI 301 hubless.

1. Fittings: Cast iron.
2. Coupling Assembly:

a. Heavy Duty: ASTM C1540, Clamp-All Hi-Torq 125, Husky SD 4000, Mifab QXHUB, Mission HeavyWeight couplings.
b. Mechanical joint coupling for hubless pipe and fittings is to consist of an elastomeric sealing sleeve and a metallic shield that comply with CISPI 310, ASTM C or ASTM C 1540. The elastomeric sealing sleeve is to conform to ASTM C564 or CSA B602 and is to be provided with a center stop. Mechanical joint couplings are to be installed in accordance with the manufacturer's instructions.

2.04 SANITARY, DRAINAGE (RAIN/STORMWATER) DWV PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A888/CISPI 301 hubless.

1. Fittings: Cast iron.
2. Coupling Assembly:

a. Standard Duty: ASTM C1277 or CISPI 310.

B. Copper Tube: ASTM B 306, DWV

1. Fittings: ASME B16.29, wrought copper.
2. Joints: ASTM B32, alloy Sn50 solder.

2.05 WATER PIPING, BURIED WITHIN 5-FEET OF BUILDING

A. Copper Pipe: ASTM B88, hard drawn, Type K (A).

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
2. Joints: Brazed – BCuP2.

B. Ductile Iron Pipe: AWWA C151/A21.51.

1. Fittings: Ductile or gray iron, standard thickness.
2. Joints: AWWA C111/A21.11, rubber gasket with 3/4-inch diameter rods, mega lug type.

2.06 HOT AND COLD DOMESTIC WATER ABOVE GRADE

A. Copper Tube: 2-1/2-inches and smaller. ASTM B88 (ASTM B88M), Type L (B), Drawn.

1. Fittings: ASME B16.18 copper.
2. Joints: ASTM B32, alloy Sn95 solder.

B. Cross-Linked Polyethylene Tubing – Type "A" – Engle Method – Fittings and Accessories (except exposed locations).

1. Tubing:

   a. Cross-linked polyethylene (PEX) tubing complies with requirements of ASTM F876 and F877, and cross-linking method must be Type A (hot)method.
   b. PEX tubing to have minimum working pressure of not less than 160 PSI for water at 73.4 degrees F, 100 PSI for water at 180 degrees F and 80 PSI for water at 200 degrees F determined in accordance with Plastic Pipe Institute Technical Report TR-3/92, and listed in Plastic Pipe Institute Technical Report TR-4/95.
   c. Co-extruded – “colored piping” (blue/red) is not to be utilized.

2. Fittings:

   a. Fittings: Engineered Plastic Fittings for above grade applications. Engineered plastic fittings for below grade applications. Serrated type with reinforcement rings.
   b. Reinforcement Rings: Manufactured using "Engel Method" to ensure that viscoelastic stress regenerative properties are sufficient to produce pressure tight seal.
   c. Fitting Insert: Of such dimension in that tubing must be expanded in order to facilitate insertion of fitting into tube.
   d. Accomplish expansion of tubing and ring by an expansion tool designed expressly for that purpose.
   e. Fittings complies with requirements of ASTM F877.

3. Manifolds: Provide premanufactured copper manifolds of same manufacturer as piping.
4. Stub-out Ells and Stub-out Brackets: Provide premanufactured Type L copper stub-out ells and copper stub-out brackets.

2.07 CONDENSATE PIPING

A. Copper Tube: ASTM B 88 (ASTM B898M), Type K (A) or L (B).

1. Fittings: ASME B16.29, wrought copper.
2. Joints: ASTM B32, alloy Sn50 solder.

B. CPVC (Chlorinated Polyvinyl Chloride) Pipe and Fittings – Except Exterior of the Building and in Plenums and Rated Assemblies:

1. Pipe and Fittings: Schedule 40, NSF-14, ASTM 439, IAPMO IS20-96, socket fittings, solvent weld.

2.08 PRIMER PIPING

A. Above Ground: Type L hard-drawn copper tubing with wrought sweat fittings and soldered joints.

B. Below Ground: Type L soft annealed copper tubing with wrought sweat fittings and brazed joints.

C. Below Ground: Cross-linked polyethylene (PEX) and engineered plastic fittings.

2.09 PIPING SPECIALTIES

A. Pipe Escutcheons:

1. Provide pipe escutcheons as specified with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime zinc base paint finish for unoccupied areas.
2. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide stainless steel, cast brass or sheet brass escutcheons, solid or split hinged.
3. Pipe Escutcheons for Dry Areas: Provide stainless steel escutcheons, solid or split hinged.

B. Low Pressure Y-Type Pipeline Strainers:

1. Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for 125 percent of the working pressure of piping system with Type 304 stainless steel screens made with 1/16-inch perforations on 4-inch and smaller strainers.
2. Threaded Ends, 2-inch and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with plus.

C. Air Vent with Valves:

1. Install automatic air vents in all closed and open-loop water systems at high points and at any other point necessary to free system of air. Provide shut-off valve in riser to each automatic vent valve to facilitate servicing. Manual type vent may be used in lieu of automatic type, where specifically shown on the Drawings.
2. Manufacturer: Hoffman #79.

D. Dielectric Waterways:

1. Provide standard products recommended by manufacturers in service indicated, which effectively isolate ferrous from non-ferrous piping (eliminating electrical conductance) to prevent galvanic action and stop corrosion.
2. Provide dielectric waterways or brass nipple fitting for transitions between dissimilar metal piping.

E. Unions:

1. Unions to comply with the following schedule:

a. Soldered Copper or Brass Pipe, 2-inch and smaller: 150 PSI cast bronzed or copper, ground joint, non-ferrous seat with soldered ends.

b. Screwed Copper or Brass Pipe, 2-inch and smaller: 150 PSI cast brass, ground joint, brass to brass seat, threaded ends.
c. Manufacturer: EPCO, Mueller, Stanley G. Flagg, Watts, or approved equivalent.

2.10 CLEANOUTS

A. Locate cleanouts as shown on Drawings and as required by local code. Cleanouts same size as pipe except that greater than 4-inches will not be required. Plastic components not allowed, except unless specifically noted.

B. Types:

1. Tile Floor Cleanouts: J. R. Smith 4020 with round heavy-duty nickel bronze top, taper thread, ABS plug and standard screws.
2. Carpeted Floor Cleanout: J. R. Smith 4020-X with carpet clamping frame, round heavy-duty nickel bronze top, taper thread, ABS plug, carpet clamping device and standard screws.
3. Concrete Floor Cleanout (General): J. R. Smith 4020 with round heavy-duty nickel bronze top, taper thread and ABS plug with standard screws.
4. Parking, Drives and Concrete Floor Cleanouts (Heavy Load): J. R. Smith 4100 with round heavy-duty nickel bronze top, taper thread and ABS plug with standard screws.
5. Wall Cleanout: J. R. Smith 4472-U, countersunk bronze taper thread plug, stainless steel shallow cover and vandalproof screws.
6. Outside Area Walks: J. R. Smith 4020-U with round heavy-duty nickel bronze top, taper thread, ABS plug and top secured with vandalproof screws. Install in 18- by 18- by 6-inch deep concrete pad flush with grade.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Underground Piping Systems:

1. Examination: Verify that excavations are to required grade, dry, and not over-excavated.
2. Perform necessary excavation and backfill required for installation of plumbing work. Repair piping or other work at no expense to Owner.
3. Water: Keep excavations free of standing water. Re-excavate and fill back excavations damaged or softened by water or frost to original level with sand, crushed rock or other approved material at no expense to Owner.
4. Tests: During progress of work for compacted fill, Owner reserves right to request compaction tests made under direction of testing laboratory.
5. Trench Excavation: Excavate trenches to necessary depth and width, removing rocks, unstable soil (muck, peat), roots and stumps. Excavation material is classified as "base fill" and "native." Base fill excavation material consisting of placed crushed rock may be used as backfill above "Pipe Zone." Remove and dispose off site native excavation material. Adequate width of trench for proper installation of piping or conduit.
6. Support Foundations:

a. Foundations: Excavate trenches located in unstable ground areas below elevation required for installation of piping to depth which is determined by Architect as appropriate for conditions encountered. Place and compact approved foundation material in excavation up to "Bedding Zone." Dewatering, placement, compaction and disposal of excavated materials to conform to requirements contained in other Specification Sections or Drawings.

b. Over-Excavations: Where trench excavation exceeds required depths, provide, place and compact suitable bedding material to proper grade or elevation at no additional cost to Owner.

c. Foundation Material: Where native material has been removed, place and compact necessary foundation material to form base for replacement of required thickness of bedding material.

	Class A		Class B	
Material Passing	**Min.**	**Max.**	**Min.**	**Max.**
3/4-inch Square Opening	**27**	**47**	**0**	**1**

d. Bedding Material: Full bed piping on sand, pea gravel, or 3/4-inch minus crushed rock. Place minimum 4-inch deep layer of sand, pea gravel, or crushed rock on leveled trench bottom for this purpose. Remove bedding to necessary depth for piping bells and couplings to maintain contact of pipe on bedding for its entire length. Provide additional bedding in excessively wet, unstable, or solid rock trench bottom conditions as required to provide firm foundation.

7. Backfilling:

a. Following installation and successful completion of required tests, backfill piping in lifts.

1) In "Pipe Zone" place backfill material and compact in lifts not to exceed 6-inches in depth to height of 12-inches above top of pipe. Place backfill material to obtain contact with entire periphery of pipe, without disturbing or displacing pipe.
2) Place and compact backfill above "Pipe Zone" in layers not to exceed 12-inches in depth.

b. Backfill Material:

1) Backfill Material in "Pipe Zone": 3/4-inch minus crushed rock, sand or pea gravel.
2) Crushed rock, fill sand or other backfill material approved elsewhere in Specifications may be used above "Pipe Zone."

8. Compaction of Trench Backfill:

a. Where compaction of trench backfill material is required, use one of following methods or combination thereof:

1) Mechanical tamper,
2) Vibratory compactor, or
3) Other approved methods appropriate to conditions encountered.

b. Architect to have right to change methods and limits to better accommodate field conditions. Compaction sufficient to attain 95 percent of maximum density at optimum moisture content unless noted otherwise on Drawings or elsewhere in Specifications. Water "puddling" or "washing" is prohibited.

B. General Installation:

1. Work performed by experienced journeyman plumbers. No exceptions.
2. Provide access panels for concealed valves, shock arrestors, trap primers and the like.
3. Install pipes and pipe fittings in accordance with recognized industry practices and manufacturer's recommendations.
4. Align piping accurately at connections, within 3/32-inch misalignment tolerance. Comply with ANSI B31 Code for Pressure Piping.
5. Locate piping runs, as indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details, and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, and other structural and permanent-enclosure elements of building. Limit clearance to 1/2-inch where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1-inch clearance outside insulation. Whenever possible in finished and occupied spaces, conceal piping from view by locating it in column enclosures, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as indicated.

a. Do not run piping through transformer vaults, telephone, elevator, electrical or electronic equipment spaces or enclosures unless indicated on Drawings.
b. Concealed Piping Above Suspended Ceiling: Plan and coordinate to avoid interferences; install to maintain suspended ceiling heights shown on Architectural Drawings. Allow sufficient space above removable ceiling panels for panel removal. Locate piping so that valves are visible and accessible within 24-inches horizontally and vertically from point of access to the ceiling space. Provide plenum rated materials for ceiling spaces which are being used as plenums.
c. Exposed Work: Run pipes parallel to the closest wall unless otherwise shown on Drawings; maintain maximum headroom; avoid light fixtures.
d. Insulation Space Allowance: In piping work, allow space for pipe insulation and jackets. If interferences occur, move the piping to accommodate insulation thickness specified.
e. Pipe Lengths: Do not use short lengths or nipples at locations where a full length of pipe will fit.
f. Alignment Prior to Supporting and Anchoring: Place piping in proper alignment and position prior to connection to anchors, expansion loops, and equipment. Furnish jacking devices, temporary steel structural members, and assembled structures as necessary. Remove temporary equipment and structures supplied by contractor at completion; such items to remain Contractor property.
g. Valve and Equipment Connections: Piping not to place undue stress on flanged valves and equipment connections. Install mating flange faces true and parallel to

each other and not requiring springing of piping for assembly. Pipe hangers and supports to carry the full weight of the pipe and fluid.

h. Piping Leaks: Correct immediately; use new materials; leak-sealing compounds or peening not permitted.

i. Pressure Ratings of Fittings, Valves, and Devices in Piping Systems: Pressure rating to be equal to, or greater than, the maximum working pressure of the system.

j. Equipment Vents and Drains: Provide for coils and vessels which contain water. Provide isolation valves and outlet valves at piping high and low points to permit venting and draining of the vessel without venting and draining connected piping. Provide hose connections and caps on drain lines.

k. Escutcheon Plates: Where exposed insulated and uninsulated piping passes through walls, floors or ceilings; provide spring clip type. Provide plates on both sides of wall or floor.

C. Testing:

1. General:

a. Provide temporary equipment for testing, including pumps, compressors, tanks, and gauges, as required. Test piping systems before insulation (if any) is installed and remove or disengage control devices before testing. Where necessary, test sections of each piping system independently, but do not use piping valves to isolate sections where test pressures exceed local valve operating pressure rating. Fill each section with water, compressed air, or nitrogen and pressurize for the indicated pressure and time.

b. Notify Architect and local Plumbing Inspector 2 days before tests.

c. Drainage, Waste and Vent Piping: Test in accordance with governing plumbing code or as follows: Test drainage and venting systems, with necessary openings plugged, to permit system to be filled with water and subjected to water pressure of minimum of 5 PSI head. System to hold water without water level drop greater than 1/2 pipe diameter of largest nominal pipe size within 24-hour period. Test system in sections if minimum head cannot be maintained in each section. 5 PSI head to be minimum pressure at highest joint.

d. Water Piping: Eliminate air from system. Fill and test at 125 PSIG or minimum 1-1/2 times static pressure at connection to serving utility main for period of two hours with no loss in pressure.

e. Send test results to Architect for review and approval and include in Operation and Maintenance Manual.

2. Testing of Pressurized Systems:

a. Test each pressurized piping system at 150 percent of operating pressure indicated, but not less than 125 PSIG test pressure.

b. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 2 percent of test pressure.

3. Test hot and cold domestic water piping systems upon completion of rough-in and before connection to fixtures at hydrostatic pressure of 125 PSIG.

D. Corrosive Soil Conditions:

1. Wrap steel, iron, copper or other metal piping materials/fittings with Protecto Wrap 200, 30 mils or greater. Maintain a 1/2-inch overlap and install per manufacturer's recommendations.
2. Provide epoxy coated cast iron pipe and fittings for drainage systems.
3. Obtain and review project soils report for verification of requirements concerning corrosive soils.

E. Protection:

1. Keep pipe openings closed by means of plugs or caps to prevent entrance of foreign matter. Protect piping, ductwork, fixtures, equipment and apparatus against dirty water, chemical or mechanical damage both before and after installation. Restore to its original condition or replace fixtures, equipment or apparatus damaged prior to final acceptance of work.

F. Firestopping Penetrations in Fire-Rated Wall/Floor Assemblies:

1. Provide proper sizing when providing sleeves or core-drilled holes to accommodate penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet requirements of ASTM E814.

G. Cut piping squarely, free of rough edges and reamed to full bore. Insert piping fully into fittings.

H. Provide joints of type indicated in each piping system.

I. Thread pipe in accordance with ANSI/ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Remove excess cutting oil from piping prior to assembly. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.

J. Sleeves:

1. Pipe Sleeves:

a. Layout work in advance of pouring concrete, furnish, and set sleeves necessary to complete work.
b. Floor Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Extend sleeve 1-inch above finished floor. Caulk pipes passing through floor with non-shrinking grout or approved caulking compound (Except DWV Piping penetrating a concrete slab set on finish grade), provide "Link-Seal" sleeve sealing system for concrete/slab penetrations which are below grade. Caulk/seal piping passing through fire rated building assembly with UL rated assemblies. Provide fire-rated assemblies per local AHJ requirements
c. Wall Sleeves: Provide sleeves on pipes passing through concrete or masonry construction. Provide sleeve flush with finished face of wall. Caulk pipes passing through walls with non-shrinking caulking compound. Provide modular link sealing system for concrete penetrations which are below grade. Caulk/seal piping passing through fire-rated assemblies per local AHJ requirements.
d. Beam Sleeves: Coordinate with trades for locations of pipe sleeves in reinforced concrete and steel beams. Indicate penetrations on structural shop drawings. See

Drawings and Specifications for specific sleeve location limitations. Plumbing Drawings are diagrammatic. Offset piping as required to meet these limitations. Pipe sleeve locations must be indicated on reinforced concrete and steel beam shop drawings. Field cutting of beams not allowed without written approval of structural engineer. No extra costs allowed for failure to coordinate beam penetrations prior to reinforced concrete and steel beam shop drawing submittal.

2. Installation of metallic or plastic piping penetrations through non fire-rated walls and partitions and through smoke-rated walls and partitions:

    a. Install fabricated pipe sleeve.
    b. After installation of sleeve and piping, tightly pack entire annular void between piping or piping insulation and sleeve identification.
    c. Seal each end airtight with a resilient nonhardening seal per code.

3. Piping penetrations through fire-rated (1 to 3 hour) assemblies:

    a. Select and install pre-engineered pipe penetration system in accordance with UL listing and manufacturer's recommendation.
    b. Provide proper sizing when providing sleeves or core-drilled holes to accommodate penetration. Firestop voids between sleeve or core-drilled hole and pipe passing through to meet requirements of ASTM E84.

END OF SECTION

SECTION 223000 – PLUMBING EQUIPMENT

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submittals as required by Section 220000, Plumbing Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Seismic anchor details and calculations signed and stamped by licensed Washington structural engineer with equipment data.

1.02 QUALITY ASSURANCE

A. Quality assurance as required by Section 220000, Plumbing Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. NSF 61, Annex G compliant.
2. ISO 9001 Certified.
3. IAPMO Low Lead Certification.

C. Products approved for installation by state authorizing agency, no exceptions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Water Heaters Tank-Less Electric:

1. Chronomite InstaFlow Micro Model M
2. EEMax
3. Stiebel Eltron
4. Or approved equivalent.

B. Commercial Light Duty Electric Storage Type Water Heaters:

1. Hubbell Series E
2. A.O. Smith
3. Bradford White
4. Bock
5. State
6. Rheem/Ruud

7. Or approved equivalent.

C. Domestic Expansion Tanks Non-ASME:

1. Bell and Gossett Series PT
2. American Wheatley
3. Amtrol
4. Armstrong
5. Watts
6. Or approved equivalent.

2.02 GENERAL

A. Reference Drawings for capacities and specific model numbers.

2.03 WATER HEATERS TANK-LESS ELECTRIC

A. System: Domestic water.

B. Factory assembled packaged tank-less electric water heater utilizing microprocessor for temperature control. Heat water ways with high temperature coil electrical heating elements. 150 PSI working pressure. Cast aluminum or steel jacket with baked enamel finish. Pilot light to indicate when unit is operating. Prewire heaters ready for single electrical connection and bear UL label. Heater capable of operation within minimum and maximum operating flow rates and pressures of fixtures served and system operating pressure

2.04 COMMERCIAL LIGHT DUTY ELECTRIC STORAGE TYPE WATER HEATERS

A. System: Domestic Hot Water

B. Entire unit is to be delivered complete with operating controls and require only plumbing and electrical service connections.

C. Tank welded steel commercial construction designed for 150 PSI. Tank is to be lined with seamless Hydrastone cement to minimum thickness of 1/2-inch on 100 percent of interior tank surfaces, and not require any type of anodic protection. Tank designed and fabricated with non-ferrous copper-silicon threaded tapings and non-ferrous inlet and outlet piping for maximum corrosion resistance. Steel tank tappings will not be acceptable. Entire tank is to be insulated with minimum of 2-inches thick polyurethane foam insulation and exceed latest ASHRAE standard for stand-by heat loss. Complete heater supplied with high impact colorized composite protective jacket which cannot rust or corrode and does not require painting.

D. Cold water inlet 3/4-inch Female NPT (1-1/2-inch Male NPT) and include non-corrosive strata-flow diffuser which prevents incoming cold water from mixing too rapidly with hot water in tank. 3/4-inch hose connection drain is supplied. Hot water outlet 3/4-inch Male NPT (1-1/2-inch Male NPT) and includes factory installed built-in heat trap to prevent water from radiating through piping during stand-by periods. Separate 3/4-inch Female NPT tapping is to be

provided for relief valve installation. An ASME rated automatic reseating combination temperature and pressure safety relief valve set at 150 PSI and 210 degrees F factory supplied.

2.05 DOMESTIC EXPANSION TANKS NON-ASME

A. Welded steel, constructed, tested and stamped in accordance with IAPMO Standards for working pressure of 125 PSI. Support floor mounted tanks with steel legs or base. Provide single flexible diaphragm securely sealed into tank to separate air charge from system water, to maintain design expansion capacity. Provide pressure gauge and air-charging fitting, and drain fitting. Diaphragm: Removable and replaceable in line.

PART 3 - EXECUTION

3.01 GENERAL

A. Examine areas and conditions under which equipment is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Install equipment in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

C. Orients so controls and devices needing service and maintenance have adequate access.

D. Certificates: Submit appropriate Certificates of Shop Inspection and Data Report as required by provisions of ASME Boiler and Pressure Vessel Code.

E. Connect water piping to units with shutoff valves and unions.

F. Equipment Start-Up:

1. Start-up, test, and adjust equipment in accordance with manufacturer's start-up instructions. Check and calibrate controls.
2. Start-up performed by authorized manufacturer's representative or agent. Provide credentials of start-up personnel to Architect and Owner's Authorized Representative for approval.
3. Remove and replace filters when start-up testing is executed.
4. Architect, Commissioning Agent, and Owner's Authorized Representative will be notified 10 days prior to start-up and will be present at start-ups.
5. Provide written report from manufacturer's representative on results of start-up within 48 hours.
6. Technical Training of maintenance staff includes two hours minimum per each piece of equipment.
7. Seismic Verification:

    a. Contractor will retain structural engineer who will submit stamped and signed anchoring and restraint details on plumbing equipment with submittal data in accordance with Division 22, Plumbing requirements.

b. Contractor's Structural Engineer will test and verify in writing that seismic restraints have been installed in accordance with their details.

END OF SECTION

SECTION 224000 – PLUMBING FIXTURES

PART 1 - GENERAL

1.01 QUALITY ASSURANCE

A. Quality assurance as required by Section 220000, Plumbing Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Comply with lead free (less than or equal to 0.25 percent) products in drinking water systems.
2. NSF 61, Annex G, Drinking Water System Components, Compliant.
3. ISO 9001, Quality Management Standard Certified.
4. IAPMO Low Lead Certification.
5. Provide fixtures, faucets and accessories to meet barrier free requirements of the governing code with respect to plumbing fixtures provided for the physically handicapped.
6. Items approved for use by State of Washington.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. "Or approved equivalent" as defined in 220000, Plumbing Basic Requirements. Substitution process requirements apply to approved equivalent products.

B. General Plumbing Fixtures: See Schedule on Drawings for type.

1. Faucet Fittings:

a. Public:

1) American Standard
2) Chicago
3) Delta Commercial
4) Moen Commercial
5) Sloan
6) Symmons
7) T & S Brass
8) Or approved equivalent.

2. Molded Resin or Stone Fixtures:

a. Fiat

b. Mustee
c. Stern Williams
d. Or approved equivalent.

3. Shower Valves:

a. Acorn
b. Chicago
c. Delta
d. Moen
e. Powers
f. Symmons
g. Or approved equivalent.

4. Stainless Steel Fixtures:

a. Elkay
b. Haws
c. Just
d. Or approved equivalent.

5. Thermostatic Mixing Valves:

a. Bradley
b. Powers
c. Symmons
d. Holby
e. Or approved equivalent.

C. Carriers:

1. JR Smith
2. Zurn
3. Or approved equivalent.

D. Fixture Trim:

1. McGuire
2. Dearborn Brass
3. Oatey
4. Or approved equivalent.

E. Floor Drains:

1. Mifab
2. Sioux Chief
3. Smith
4. Wade
5. Watts
6. Zurn

F. Flushometers – Water Closet/Urinal:

1. Delaney
2. Sloan
3. Zurn
4. Or approved equivalent.

G. Hose Bibbs:

1. Chicago
2. JR Smith
3. Mifab
4. Wade
5. Woodford
6. Zurn
7. Or approved equivalent.

H. Water Closet Seats:

1. Bemis
2. Or approved equivalent.

2.02 GENERAL PLUMBING FIXTURES

A. Reference Architectural Details for mounting height and location of fixtures.

B. Provide factory fabricated fixtures of type, style and material indicated on the plumbing fixture connection schedule shown on the Drawings. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by manufacturer, or required for complete installation. Where more than one type is indicated, selection is installer's option; but, fixtures of same type must be furnished by a single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

C. Provide fixtures complete with fittings, supports, fastening devices, bolt caps, faucets, valves, traps, stops and appurtenances.

D. Plumbing Fixture Thermostatic Mixing Valves:

1. Lavatories provide ASSE 1070 compliant mixing valves or multiple lavatories served by a single ASSE 1070 compliant mixing valve.
2. Sinks serviced with a single ASSE 1070 mixing valve or multiple sinks served by a single ASSE 1070 mixing valve.

2.03 CARRIERS

A. Wall Hung Water Closets:

1. Vertical: Zurn Z-1204-N4-X-50 or Z-1204-ND4-X-50 (JR Smith 230y-M54-M12 or 230DY-M54-M12). Adjustable vertical load siphon jet with 500 lb. capacity.
2. Horizontal: Zurn ZE-1203-N4-X-50 or ZE-1203-ND4-X-50 (JR Smith 220 R or L-Y-M54-M12 or 220DY-M54-M12). Adjustable horizontal siphon jet with 500 lb. load capacity.

B. Wall Hung Urinal: Zurn Z-1218-WS or Z-1222-WS. (JR Smith 637). Coupling type or plate type with bearing plate 200 lb. capacity.

C. Wall Hung Lavatory: Zurn Z-1231 (D). (JR Smith 700). Concealed arm or Plate type, 250 lb. capacity.

D. Wall Hung Service Sink: Zurn Z-1218. (JR Smith 913/914). Coupling type. 300 lb. capacity.

E. Wall Hung Drinking Fountain: Zurn Z-1225-BL (JR Smith 834-97-98). Plate type. 300 lb. capacity.

2.04 FIXTURE TRIM

A. Traps: Provide heavy duty commercial grade traps on fixtures except fixtures with integral traps. Exposed traps will be chromium plated cast brass or 17 gauge chromium plated brass tubing.

1. Sink: McGuire 8912CDF.
2. Lavatory: McGuire 8902CDF.

B. Supplies and Stops: Lead free heavy duty commercial grade, chrome plated with brass stems. Stops: T-handle or Loose Key type.

1. Lavatory: McGuire LFH2165LK.
2. Sink: McGuire LFH2167LK.
3. Water Closets: McGuire.

C. Lavatory Grid Strainer: McGuire 155A.

D. Sink Grid Strainer: McGuire 152N.

E. Shower Grid Strainer: McGuire 1266.

F. Sink Basket Strainer: McGuire 151.

G. Trim barrier-free wrap for P-traps and supplies by McGuire, Pro-Wrap, Plumberex or True-bro.

H. Escutcheons: McGuire wrought brass deep bell.

I. Wax Rings and Toilet Bolts: WM Harvey No Seep No. 1 053065-N.

PART 3 - EXECUTION

3.01 GENERAL PLUMBING FIXTURE INSTALLATION INFORMATION

A. Verification of Conditions:

1. Examine rough-in work of water supply and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures.
2. Examine walls, floors and cabinets for suitable conditions where fixtures are to be installed.
3. Install plumbing fixtures level and plumb, in accordance with fixture manufacturer's written instructions, rough-in drawings and pertinent codes and regulations, design and referenced standards.
4. Fasten plumbing fixtures securely to supports or building structure. Secure supplies behind or within wall construction to provide rigid installation.
5. Install a stop valve in a readily accessible location in water connection to each fixture.
6. Install escutcheons at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.
7. Seal fixtures to walls and floors using silicone sealant Dow Corning No. 780 or approved equivalent. Match sealant color to fixture color.
8. Test fixtures to demonstrate proper operation upon completion of installation and after units are water pressurized. Replace malfunctioning units, then retest.
9. Inspect each unit for damage prior to installation. Replace damaged fixtures.
10. Replace washers or cartridges of leaking or dripping faucets and stops.
11. Clean fixtures, trim and strainers using manufacturer's recommended cleaning methods and materials.
12. During construction, cover installed fixtures, drains, sinks and water coolers with cardboard and wrap with sheet plastic.
13. Provide trap primers for floor drains, floor sinks, trench drains and hub drains.
14. Install roof and overflow roof drains per architectural details. Cover drains during roof construction to protect drain. Provide offsets or expansion joints at each roof/overflow drain.
15. Do not use lead flashing.

B. Owner Furnished Equipment:

1. Rough-in and make final connections to Owner furnished equipment, including the existing Admin Building and Dumpster/Trash Compactor. Provide necessary items to complete installation.
2. Comply with requirements of this Section and Drawings for installation procedures.

C. Adjusting and Cleaning: Clean plumbing fixtures, trim, and strainers of dirt and debris upon completion of installation. Adjust water pressure at drinking fountains, faucets, shower valves and flush valves to provide proper flow stream and specified GPM. Repair leaks at faucets and stops.

D. Extra Stock: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner.

E. Field Quality Control: Upon completion of installation of plumbing fixtures, test fixtures to demonstrate capability and compliance with Specifications. Correct or replace malfunctioning units at site, then retest to demonstrate compliance.

F. Protection: Protect fixtures and equipment from damage. Cover finished fixtures with cardboard and sheet plastic. Fixtures are not to be used during construction. Replace damaged items with new.

G. Signage: For fixtures that do not have ASSE 1070 mixing valve protection for hot water temperature, provide signage per Section 22 05 53, Identification for Plumbing Piping and Equipment.

END OF SECTION

SECTION 230000 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work included in 23 00 00, HVAC Basic Requirements applies to Division 23, HVAC work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of heating, ventilating and air conditioning systems for proposed project.

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, Owner/Architect Agreement, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

C. Definitions:

1. Provide: To furnish and install, complete and ready for intended use.
2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work provided.
4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent", substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.
5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's Authorized Representative, and other reviewing entity whose approval is required to obtain systems acceptance.

1.2 RELATED SECTIONS

A. Contents of Section applies to Division 23, HVAC Contract Documents.

B. Related Work:

1. Additional conditions apply to this Division including, but not limited to:

a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
b. Drawings
c. Addenda

d. Owner/Architect Agreement
e. Owner/Contractor Agreement
f. Codes, Standards, Public Ordinances and Permits

1.3 REFERENCES AND STANDARDS

A. References and Standards per Division 01, General Requirements, individual Division 23, HVAC Sections and those listed in this Section.

B. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:

1. State of Washington:

a. IBC – International Building Code
b. IFC – International Fire Code
c. IMC – International Mechanical Code
d. NEC – National Electrical Code
e. UPC – Uniform Plumbing Code
f. WAC – Washington Administrative Code
g. WSEC – Washington State Energy Code

C. Reference standards and guidelines include but are not limited to the latest adopted editions from:

1. ABA – Architectural Barriers Act
2. ABMA – American Bearing Manufacturers Association
3. ADA – Americans with Disabilities Act
4. AHRI – Air-Conditioning Heating & Refrigeration Institute
5. AMCA – Air Movement and Control Association
6. ANSI – American National Standards Institute
7. ASCE – American Society of Civil Engineers
8. ASHRAE – American Society of Heating, Refrigeration and Air-Conditioning Engineers
9. ASHRAE Guideline 0, The Commissioning Process
10. ASME – American Society of Mechanical Engineers
11. ASPE – American Society of Plumbing Engineers
12. ASSE – American Society of Sanitary Engineering
13. ASTM – ASTM International
14. AWWA – American Water Works Association
15. CFR – Code of Federal Regulations
16. CGA – Compressed Gas Association
17. CISPI – Cast Iron Soil Pipe Institute
18. EPA – Environmental Protection Agency
19. ETL – Electrical Testing Laboratories
20. FM – FM Global
21. GAMA – Gas Appliance Manufacturers Association
22. HI – Hydraulic Institute Standards
23. IAPMO – International Association of Plumbing & Mechanical Officials
24. IFGC – International Fuel Gas Code
25. ISO – International Organization for Standardization

26. MSS – Manufacturers Standardization Society
27. NEC – National Electric Code
28. NEMA – National Electrical Manufactures Association
29. NFPA – National Fire Protection Association
30. NFGC – National Fuel Gas Code
31. NRCA – National Roofing Contractors Association
32. NSF – National Sanitation Foundation
33. OSHA – Occupational Safety and Health Administration
34. SMACNA – Sheet Metal and Air Conditioning Contractors' National Association, Inc.
35. TEMA – Tubular Exchanger Manufactures Association
36. TIMA – Thermal Insulation Manufactures Association
37. UL – Underwriters Laboratories, Inc.

D. See Division 23, HVAC individual Sections for additional references.

1.4 SUBMITTALS

A. See Division 01, General Requirements for Submittal Procedures as well as specific individual Division 23, HVAC Sections.

B. Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.

C. In addition:

1. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.
2. Provide product submittals and shop drawings in electronic format only. Electronic format must be posted to ftp site and be native/searchable PDF format. Scanned copies are not acceptable. For electronic format, provide one file per division containing one bookmarked PDF file with each bookmark corresponding to each Specification Section. Arrange bookmarks in ascending order of Specification Section number. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. All transmissions/submissions to be submitted to Architect. Deviations will be returned without review.
3. Product Data: Provide Manufacturer's descriptive literature for products specified in Division 23, HVAC Sections.
4. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the Specifications and Drawings.

    a. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross

out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.

b. Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference individual Division 23, HVAC Specification Sections for specific items required in product data submittal outside of these requirements.
c. Provide pump curves, operation characteristics, capacities, ambient noise criteria, etc. for equipment.
d. For vibration isolation of equipment, list make and model selected with operating load and deflection.
e. See Division 23, HVAC individual Sections for additional submittal requirements outside of these requirements.

5. Maximum of two reviews of submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of these additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.
6. Resubmission Requirements: Make corrections or changes in submittals as required, and in consideration of Engineer’s comments. Identify Engineer’s comments and provide an individual response to each of the Engineer’s comments. Cloud changes in the submittals and further identify changes which are in response to Engineer’s comments.
7. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support. Indicate manufacturer's installation and support requirements to meet ASCE 7-16 requirements for non-structural components. Provide engineered seismic drawings and equipment seismic certification. Equipment Importance Factor as specified in Division 01 and in Structural documents.
8. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required by Division 23, HVAC Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.
9. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
10. Substitutions and Variation from Basis of Design:

    a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
    b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties proposing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid, including resulting charges for work performed under other Divisions, will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to bid.

11. Shop Drawings: Provide coordinated shop drawings which include physical characteristics of all systems, equipment, ductwork and piping layout plans, and control wiring diagrams. Reference individual Division 23, HVAC Specification Sections for additional requirements for shop drawings outside of these requirements.

    a. Provide Shop Drawings indicating access panel locations for items that require Code or maintenance access, size and elevation for approval prior to installation.

12. Samples: Provide samples when requested by individual Sections.
13. Resubmission Requirements:

    a. Make any corrections or change in submittals when required. Provide submittals as specified. The Engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.

        1) Resubmit for review until review indicates no exception taken or make "corrections as noted".
        2) When submitting drawings for Engineer's re-review, clearly indicate changes on drawings and "cloud" any revisions. Submit a list describing each change.

14. Operation and Maintenance Manuals, Owner's Instructions:

    a. Submit, at one time, electronic files (native/searchable PDF format) of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.

        1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.
        2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment: belts, motors, lubricants, and filters.
        3) Include Warranty per Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Sections.
        4) Include product certificates of warranties and guarantees.
        5) Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub-assemblies.
        6) Include copy of startup and test reports specific to each piece of equipment.
        7) Include copy of final air and water systems balancing log along with pump, fan and distribution system operating data.
        8) Include commissioning reports.

9) Include copy of valve charts/schedules.
10) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.

b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 23 00 00, HVAC Basic Requirements Article titled "Demonstration".
c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

15. Record Drawings:

a. Maintain at site at least one set of drawings for recording “As-constructed” conditions. Indicate on drawings changes to original documents by referencing revision document, and include buried elements, location of cleanouts, and location of concealed mechanical items. Include items changed by field orders, supplemental instructions, and constructed conditions.
b. Record Drawings are to include equipment and fixture/connection schedules, control dampers, fire smoke dampers, fire dampers, valves, bottom of pipe, duct and equipment elevations and dimensioned locations for all distribution systems (hydronic and air). Invert elevations and dimensioned locations for underground systems below grade to 5-feet outside building that accurately reflect "as constructed or installed" for project.
c. At completion of project, input changes to original project CAD Drawings and make one set of black-line drawings created from CAD Files in version/release equal to contract drawings. Submit CAD Files and drawings upon substantial completion.
d. At completion of project, show changes and deviations from the Drawings in red on one set of black-line drawings. Include written Addendums, RFIs, and change order items. Make changes to Drawings in a neat, clean, and legible manner.
e. See Division 23, HVAC individual Sections for additional items to include in record drawings.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Work and materials installed to conform with all local, State and Federal codes, and other applicable laws and regulations. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.

B. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

C. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., piping) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.

D. Manufacturer's Instructions: Follow manufacturers' written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

E. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.

F. Provide products that are UL listed.

G. Piping and duct insulation products to contain less than 0.1 percent by weight PBDE in all insulating materials.

H. ASME Compliance: ASME listed water heaters and boilers with an input of 200,000 BTUH and higher, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by code or local jurisdiction.

I. Provide safety controls required by National Boiler Code (ASME CSD 1) for boilers and water heaters with an input of 400,000 BTUH and higher.

1.6 WARRANTY

A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Contracting and Procurement Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

1.7 COORDINATION DOCUMENTS

A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, equipment, fire sprinklers, plumbing, cable trays, lights, and electrical services with architectural and structural requirements, and other trades (including ceiling suspension, and tile systems), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.

B. Advise Architect in event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

C. Submit final Coordination Drawings with changes as Record Drawings at completion of project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer, including but not limited to pumps, fans, valves, control devices, air handlers, vibration isolation devices, etc.

2.2 STANDARDS OF MATERIALS AND WORKMANSHIP

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL listed and labeled or be approved by State, County, and City authorities prior to procurement and installation.

B. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

C. Hazardous Materials:

1. Comply with local, State of Washington, and Federal regulations relating to hazardous materials.
2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.
3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.

PART 3 - EXECUTION

3.1 ACCESSIBILITY AND INSTALLATION

A. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Install equipment having components requiring access (i.e., drain pans, drains, control operators, valves, motors and vibration isolation devices) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles or crawlspaces which would impede, or block intended usage.

C. Install equipment and products complete as directed by manufacturer's installation instructions including all appurtenances recommended in manufacturer's installation instructions, at no additional charge to Owner. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing and coordination with other trades and disciplines.

D. Pipe Installation:

1. Provide installation of piping systems coordinated to account for expansion and contraction of piping materials and building, as well as anticipated settlement or shrinkage of building. Install work to prevent damage to piping, equipment, and building and its contents. Provide piping offsets, loops, seismic flexible joints, expansion joints, sleeves, anchors or other means to control pipe movement and minimize forces on piping. Verify anticipated settlement and/or shrinkage of building with Project Structural Engineer. Verify construction phasing, type of building construction products and rating for coordinating installation of piping systems.
2. Include provisions for servicing and removal of equipment without dismantling piping.

E. Plenums:

1. Plenums: Materials within plenums shall be noncombustible or shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723. Immediately notify Architect/Engineer of any discrepancy.

F. Provide miscellaneous supports/metals required for installation of equipment, piping, and ductwork.

3.2 SEISMIC CONTROL

A. Confirm Seismic Control requirements in Division 01, General Requirements, Structural documents, and individual Division 23 HVAC Sections.

B. General:

1. Earthquake resistant designs for HVAC (Division 23) equipment and distribution, i.e. motors, ductwork, piping, equipment, etc. to conform to regulations of jurisdiction having authority.
2. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.
3. Provide stamped Shop Drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for piping equipment and water heaters. Submit Shop Drawings along with equipment submittals.

4. Provide stamped Shop Drawings from licensed Structural Engineer of seismic flexible joints for piping and crossing building expansion or seismic joints. Submit Shop Drawings along with seismic bracing details.

C. Piping and Ductwork:

1. Per "Seismic Restraints Manual Guidelines for Mechanical Systems" latest edition published by SMACNA or local requirements.

D. Provide means to prohibit excessive motion of mechanical equipment during earthquake.

3.3 REVIEW AND OBSERVATION

A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:

1. Underground system installation prior to backfilling.
2. Prior to covering walls.
3. Prior to ceiling cover/installation.
4. After major equipment is installed.
5. When main systems, or portions of, are being tested and ready for inspection by AHJ.

C. Final Punch:

1. Prior to requesting a final punch visit from the Engineer, request from Engineer the Mechanical Precloseout Checklist, complete the checklist confirming completion of systems' installation, and return to Engineer. Request a final punch visit from the Engineer, upon Engineer's acceptance that the mechanical systems are ready for final punch.
2. Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

3.4 CUTTING AND PATCHING

A. Confirm Cutting and Patching requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to Project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).

2. Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section will be performed by skilled craftspeople of each respective trade in conformance with appropriate Division of Work.
3. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.
4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing conduit and devices are removed as part of this project. Where alterations disturb lawns, paving, and walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.
5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

3.5 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

B. Maintain design intent where equipment other than as shown as Basis of Design in Contract Documents is provided. Where equipment requires ductwork or piping arrangement, controls/control diagrams, or sequencing different from that indicated in Contract Documents, provide at no additional cost to Owner.

3.6 DELIVERY, STORAGE AND HANDLING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust. Insulation and lining that becomes wet from improper storage and handling to be replaced before installation. Products and/or materials that become damaged due to water, dirt, and/or dust as a result of improper storage to be replaced before installation.
2. Protect equipment and pipe to avoid damage. Close pipe openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.
3. Protect bright finished shafts, bearing housings and similar items until in service.

3.7 DEMONSTRATION

A. Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Upon completion of work and adjustment of equipment and test systems, demonstrate to Owner's Authorized Representative, Architect and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

C. Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

3.8 CLEANING

A. Confirm Cleaning requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

3.9 START UP

A. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

1. Do not place equipment in sustained operation prior to initial balancing of HVAC systems.

3.10 PAINTING

A. Confirm Painting requirements in Division 01, General Requirements and Division 09, Finishes. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. Ferrous Metal: After completion of work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces in mechanical rooms, i.e., hangers, hanger rods, equipment stands, with one coat of black asphalt varnish for exterior or black enamel for interior, suitable for hot surfaces.
2. After acceptance by Authority Having Jurisdiction (AHJ), In a mechanical room, on roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.
3. See individual equipment Specifications for other painting.
4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.

5. Piping and Ductwork: Clean, primer coat and paint exposed piping and ductwork on roof or at other exterior locations with two coats paint suitable for metallic surfaces and exterior exposures. Color selected by Architect.
6. Covers: Covers such as manholes, cleanouts and the like will be furnished with finishes which resist corrosion and rust.

3.11 DEMOLITION

A. Confirm requirements in Division 01, General Requirements and Division 02, Existing Conditions. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. Scope:

    a. It is the intent of these documents to provide necessary information and adjustments to the HVAC system required to meet code, and accommodate installation of new work.
    b. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas.
    c. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.

2. Equipment: Unless otherwise directed, equipment, fixtures, or fittings being removed as part of demolition process are Owner's property. Remove other items not scheduled to be reused or relocated from job site as directed by Owner.
3. Unless specifically indicated on Drawings, remove exposed, unused ductwork and piping to behind finished surfaces (floor, walls, ceilings, etc.). Cap and patch surfaces to match surrounding finish.
4. Unless specifically indicated on Drawings, remove unused equipment, fixtures, fittings, rough-ins, and connectors. Removal is to be to a point behind finished surfaces (floors, walls, and ceilings).

3.12 ACCEPTANCE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 23, HVAC Sections and the following:

1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:

    a. Testing and Balancing Reports
    b. Cleaning
    c. Operation and Maintenance Manuals
    d. Training of Operating Personnel

e. Record Drawings
f. Warranty and Guaranty Certificates
g. Start-up/Test Document
h. Commissioning Reports

3.13 FIELD QUALITY CONTROL

A. Confirm Field Quality Control requirements in Division 01, General Requirements, Section 23 00 00, HVAC Basic Requirements and individual Division 23, HVAC Sections.

B. Tests:

1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in Operation and Maintenance Manuals.
2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

3.14 ELECTRICAL INTERLOCKS

A. Where equipment motors are to be electrically interlocked with other equipment for simultaneous operation, utilize equipment wiring diagrams to coordinate with electrical systems so that proper wiring of equipment involved is affected.

END OF SECTION

SECTION 230529 – HANGERS & SUPPORTS FOR HVAC PIPING, DUCTWORK & EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Hangers and Supports for HVAC Piping, Ductwork and Equipment
2. Wall and Floor Sleeves
3. Building Attachments
4. Flashing
5. Miscellaneous Metal and Materials

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. ASCE 7-16, Minimum Design Loads for Buildings and Other Structures.
2. Terminology: As defined in MSS SP-90 "Guidelines on Terminology for Pipe Hangers and Supports".
3. Install ductwork and piping per SMACNA's requirements.
4. Hanger spacing installation and attachment to meet all manufacturer's requirements and MSS SP-58.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Welding:

a. Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications".

2. Welding for Hangers:

a. Qualify procedures and personnel according to AWS D9.1, Sheet Metal Welding Code for duct joint and seam welding.

3. Engineering Responsibility:

a. Design and preparation of Shop Drawings and calculations for each multiple pipe support, trapeze, duct support equipment hangers/supports, support from floor structure, roof structure or from structure above, and seismic restraint by a qualified Structural Professional Engineer.

1) Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.

4. Manufacturers regularly engaged in the manufacture of bolted metal framing support systems, whose products have been in satisfactory use in similar service for not less than 10 years.
5. Support systems to be supplied by a single manufacturer.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.07 PERFORMANCE REQUIREMENTS

A. Provide pipe, ductwork and equipment hangers and supports in accordance with the following:

1. When supports, anchorages, and seismic restraints for equipment, and supports, anchorages, and seismic restraints for conduit, piping, and ductwork are not shown on the Drawings, the contractor is responsible for their design.
2. Connections to structural framing not to introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.

B. Engineered Support Systems:

1. Support frames such as pipe racks or stanchions for piping, ductwork, and equipment which provide support from below.
2. Equipment, ductwork and piping support frame anchorage to supporting slab or structure.

C. Provide channel support systems, for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

D. Provide heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

E. Provide seismic restraint hangers and supports for piping, ductwork and equipment.

F. Obtain approval from AHJ for seismic restraint hanger and support system to be installed for piping and equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Hangers and Supports for HVAC Piping, Ductwork and Equipment:

1. Anvil International
2. B-Line Systems, Incorporated
3. Erico Company, Incorporated
4. Nelson-Olsen Incorporated
5. Rilco Manufacturing Company, Incorporated
6. Snappitz Thermal Pipe Shield Manufacturing
7. Unistrut Corporation

B. Wall and Floor Sleeves:

1. Thunderline Corporation “Link Seal.”
2. Or approved equivalent.

C. Building Attachments:

1. Anchor-It
2. Gunnebo Fastening Corporation
3. Hilti Corporation
4. ITW Ramset/Red Head
5. Masterset Fastening Systems, Incorporated

2.02 HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

A. Hanger Rods: Hanger rods continuously threaded or threaded ends only in concealed spaces and threaded ends only in exposed spaces; finish electro-galvanized or cadmium-plated in concealed spaces and prime painted in exposed spaces; sizes per MSS.

B. Hanger Rod Couplings: Anvil Figure 136, B-Line Figure B3220, or approved equivalent; malleable iron rod coupling with elongated center sight gap for visual inspection; to have same finish as hanger rods.

C. Channel Hanging System:

1. Framing members No. 12 gauge formed steel channels, 1-5/8-inch square, conforming to ASTM A1011 Grade 33, one side of channel to have a continuous slot within turned lips; framing nut with grooves and spring 1/2-inch size, conforming to ASTM 675 GR60; screws conforming to ASTM A307; fittings conforming to ASTM A575; parts enamel painted or electro-galvanized.
2. Concrete Inserts: Malleable iron body, hot dipped galvanized finish. Lateral adjustment. MSS Type 18.

D. Continuous Concrete Insert: Steel construction, minimum 12 gauge. Electrogalvanized finish. Pipe clamps and insert nuts to match.

E. Pipe Hangers:

1. Pipe Rings for Hanger Rods:

a. Pipe Sizes 2-inches and Smaller: Adjustable swivel ring hanger, UL listed. Erico 100 or 101, Anvil Figures 69 or 104, or approved equivalent.
b. Pipe Sizes 2-1/2-inches and Larger: Clevis type hangers with adjustable nuts on rod, UL listed. Anvil figure 260, Erico 400, or approved equivalent.
c. Pipe hangers to have same finish as hanger rods.

F. Pipe Saddles and Shields:

1. Factory fabricated saddles or shields under piping hangers and supports for insulated piping.
2. Size saddles and shields for exact fit to mate with pipe insulation. 1/2 round, 18 gauge, minimum 12-inches in length (4-inch pipe and larger to be three times longer than pipe diameter).

G. Riser Clamps: Steel, UL listed. MSS Type 8. Erico 510 or 511. Copper coated; Erico 368.

H. Pipe Slides: Anvil, reinforced Teflon slide material (3/32-inch minimum thickness) bonded to steel; highly finished steel or stainless steel contact surfaces to resists corrosion; 60-80 PSI maximum active contact surface loading; steel parts 3/16-inch minimum thickness; attachment to pipe and framing by welding.

I. Pipe Guides:

1. Furnish and install pipe guides on continuous runs where pipe alignment must be maintained. Minimum two on each side of expansion joints, spaced per manufacturer's recommendations for pipe size. Fasten guides securely to pipe and structure. Contact with chilled water pipe not to permit heat to be transferred in sufficient quantity to cause condensation on any surface.
2. Furnish and install guides approximately four pipe diameters (first guide) and 14 diameters (second guide) away from each end of expansion joints. Guides are not to be used as supports and are in addition to other pipe hangers and supports.

J. Pipe Roller Hangers: Adjustable roller hanger. Black steel yoke, cast iron roller. MSS Type 41.

K. Thermal Hanger Shield Inserts:

1. 100-PSI (690-kPa) minimum compressive strength calcium silicate insulation, encased in sheet metal shield or polyisocyanurate rigid foam exceeding the load bearing weight of the pipe at the hanger point with a PVC vapor barrier.
2. Material for Cold Piping: Water-repellent-treated, ASTM C533, Type I calcium silicate with vapor barrier or polyisocyanurate rigid foam with a PVC vapor barrier.
3. Material for Hot Piping: Water-repellent-treated ASTM C533, Type 1 calcium silicate or polyisocyanurate rigid foam with a PVC vapor barrier.
4. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
5. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.
6. Insert Length: Extend 2-inches beyond sheet metal shield for piping operating below ambient air temperature.
7. Thermal Hanger Shield Insulation Operating Temperature: Meet or exceed fluid temperature in pipe.

2.03 WALL AND FLOOR SLEEVES

A. Below Grade or High Water Table Areas:

1. "Link-Seal" Pipe Sleeves: Neoprene gasket links bolted together around an interior sleeve forming a watertight seal.
2. Provide Type S unless otherwise noted.

B. Fabricated Accessories:

1. Steel Pipe Sleeves: Fabricate from Schedule 40 black or galvanized steel pipe. Remove end burrs by grinding.
2. Sheet Metal Pipe Sleeves: Fabricate from G-90 galvanized sheets closed with lock-seam joints. Provide the following minimum gauges for the sizes indicated:

    a. Sleeve Size 4-inches in Diameter and Smaller: 18 gauge.
    b. Sleeve Sizes 5-6-inches: 16 gauge.
    c. Sleeve Sizes 7-inches and Larger: 14 gauge.
    d. Fire-Rated Safing Material.

        1) Rockwool Insulation: Complying with FS-HH-I-558, Form A, Class IV, 6 pounds per cubic foot density with melting point of 1985 degrees F and K value of 0.24 at 75 degrees F.
        2) Calcium Silicate Insulation: Noncombustible, complying with FS-HH-I-523, Type II, suitable for 100 degrees F to 1200 degrees F service with K value of 0.40 at 150 degrees F.

2.04 BUILDING ATTACHMENTS

A. Beam Clamps:

1. MSS Type 19 and 23, wide throat, with retaining clip.
2. Universal Side Beam Clamp: MSS Type 20.

B. Powder-Actuated Drive Pin Fasteners: Powder actuated type, drive pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

C. Anchor Bolts:

1. Anchor supports to existing masonry, block and tile walls per anchoring system manufacturer's recommendations or as modified by project structural engineer. Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
2. Anchor Bolts (Cast-In-Place): Steel bolts, ASTM A307. Nuts to conform to ASTM A194. Design values for shear and tension not more than 80 percent of the allowable listed loads.
3. Anchor (Expansion) Bolts: Carbon steel to ASTM A307; nut to conform to ASTM A194; drilled-in type. Design values for shear and tension not more than 80 percent of the allowable listed loads.
4. Anchor (Adhesive) Bolts: Consisting of two-part adhesive cartridge and zinc-plated Type A307 steel anchor bolt rod assembly with ASTM A194 nut.

2.05 FLASHING

A. Steel Flashing: 26 gauge galvanized steel.

B. Safes: 8 mil thick neoprene.

C. Caps: Steel, 22 gauge minimum, 16 gauge at fire-resistant structures.

2.06 MISCELLANEOUS METAL AND MATERIALS

A. General:

1. Provide miscellaneous supports and metal items, including materials, fabrication, fastenings and accessories required for finished installation, where indicated on drawings or otherwise not shown on drawings that are necessary for completion of the project. Contractor is responsible for their design.
2. Fabricate miscellaneous units to size shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

B. Structural Shapes: Where miscellaneous metal items are needed to be fabricated from structural steel shapes and plates, provide members constructed of steel conforming with requirements of ASTM A36 or approved equivalent.

C. Steel Pipe: Provide seamless steel pipe conforming to requirements of ASTM A53, Type S, Grade A, or Grade B. Weight and size required as specified.

D. Fasteners: Provide fasteners of types as required for assembly and installation of fabricated items; surface-applied fasteners are specified elsewhere.

E. Bolts: Low carbon steel externally and internally threaded fasteners conforming with requirements of ASTM A307; include necessary nuts and plain hardened washers. For structural steel elements supporting mechanical material or equipment from building structural members or connection thereto, use fasteners conforming to ASTM A325.

F. Miscellaneous Materials: Provide incidental accessory materials, tools, methods, and equipment required for fabrication.

G. Provide hot dipped galvanized components for items exposed to weather. Cold galvanize field-welded joints and components. Use materials compatible with system being supported (i.e. aluminum for aluminum ductwork, stainless steel for stainless steel ductwork).

H. Use straps, threshold rods and wire with sizes required by SMACNA to support ductwork.

I. Grout:

1. ASTM C1107, Grade B, factory mixed and packaged, nonshrink and nonmetallic, dry, hydraulic-cement grout.
2. Characteristics: Post hardening and volume adjusting; recommended for both interior and exterior applications.
3. Properties: Nonstaining, noncorrosive, and non gaseous.
4. Design Mix: 5000-PSI (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Verify building materials to have hangers and attachments affixed in accordance with hangers to be used. Provide supporting calculations.

B. Examine Drawings and coordinate for verification of exact locations of fire and smoke rated walls, partitions, floors and other assemblies. Indicate, by shading and labeling on Record Drawings such locations and label as "1-Hour Wall", "2-Hour Fire/Smoke Barrier", and the like. Determine proper locations for piping penetrations. Set sleeves in place in new floors, walls or roofs prior to concrete pour or grouting.

C. Install hangers, supports, anchors and sleeves after required building structural work has been completed in areas where the work is to be installed. Coordinate proper placement of inserts, anchors and other building structural attachments.

D. Equipment Clearances: Do not route ductwork, equipment, or piping through electrical rooms or other electrical or electronic equipment spaces and enclosures and the like. Within equipment rooms, provide minimum 3-feet lateral clearance from all sides of electric switchgear panels. Do not route ductwork, equipment, or piping above any electric power or lighting panel, switchgear, or similar electric device. Coordinate with Electrical and coordinate exact ductwork, equipment or pipe routing to provide proper clearance with such items.

3.02 HANGERS AND SUPPORTS FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

A. Hang rectangular sheet-metal ducts with a cross sectional area of less than 7 SF with galvanized strips of No. 16 USS gauge steel 1-inch wide, and larger ducts with steel angles and adjustable hanger rods similar to piping hangers. Support at a maximum of 8-feet on center.

B. Support horizontal ducts within 24-inches of each elbow and within 48-inches of each branch intersection.

C. Design hangers and supports to allow for expansion and contraction.

D. Provide aluminum supports for aluminum ductwork.

E. Provide stainless steel supports for stainless steel ductwork.

F. Support vertical ducts at maximum intervals of 16-feet and at each floor.

G. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

H. Install flexible ductwork per the more stringent of SMACNA HVAC Duct Construction Standards or the following:

1. Support horizontal duct runs at not more than 4 feet intervals.
2. Support vertical risers at not more than 6 feet intervals.
3. Limit sag between support hangers to 1/2-inch per foot of spacing support.
4. Supports shall be rigid and shall be not less than 1.5-inches wide at point of contact with the duct surface.
5. Duct bends shall be not less than 1.5 duct diameter bend radius.

I. Use double nuts and lock washers on threaded rod supports.

J. Floor supports in mechanical rooms to be elevated 1-inch above finish floor and void space filled with masonry grout.

K. Anchor ducts securely to building in such a manner as to prevent transmission of vibration to structure. Do not connect duct hanger straps directly to roof deck. Do not support ducts from other ducts, piping or equipment.

L. Attach strap hangers installed flush with end of sheet-metal duct run to duct with sheet-metal screws.

M. Construct exterior ductwork or ductwork which is otherwise exposed to weather watertight and slope 1/4-inch per foot to avoid standing water.

N. Exposed ductwork hung in clean areas such as sanitary areas, pharmaceutical areas, wash down areas or food process areas to be installed using double end, food grade trapeze hanger rods suitable for use with food grade strut.

O. Channel Support System Installation:

1. Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.
2. Field assemble and install according to manufacturer's written instructions.

P. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

Q. Install hangers and supports to allow controlled thermal and seismic 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.

R. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

S. Adjust hangers so as to distribute loads equally on attachments. Provide grout under supports to bring piping, ductwork and equipment to proper level and elevations.

T. Prime paint ferrous nongalvanized hangers, accessories, and supplementary steel which are not factory painted.

U. Horizontal Piping Hangers and Supports; Horizontal and Vertical Piping, and Hanger Rod Attachments:

1. Factory fabricated horizontal piping hangers and supports complying with MSS SP-58, to suit piping systems and in accordance with manufacturer's published product information.
2. Use only one type by one manufacturer for each piping service.
3. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping.
4. Pipe support spacing (pipe supported in ceiling or floor-supported) to meet latest applicable Code and manufacturer's requirements.
5. Provide copper-plated hangers and supports for uninsulated copper piping systems.

V. Plumber's Tape not permitted as pipe hangers or pipe straps.

W. Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. For horizontally hung grooved-end piping, provide a minimum of 2 hangers per pipe section.

X. Pipe Ring Diameters:

1. Uninsulated and Insulated Pipe, Except Where Oversized Pipe Rings are Specified: Ring inner diameter to suit pipe outer diameter.
2. Insulated Piping Where Oversized Pipe Rings are Specified and Vibration Isolating Sleeves: Ring inner diameter to suit outer diameter of insulation or sleeve.

Y. Oversize Pipe Rings: Provide oversize pipe rings of 2-inch and larger size.

Z. Pipe Support Brackets: Support pipe with pipe slides.

AA. Steel Backing in Walls: Provide steel backing in walls to support fixtures and piping hung from steel stud walls.

BB. Pipe Guides:

1. Install on continuous runs where pipe alignment must be maintained. Minimum two on each side of expansion joints, spaced per manufacturer's recommendations for pipe size. Fasten guides to pipe structure. Contact with chilled water pipe does not permit heat to be transferred in sufficient quantity to cause condensation on any surface.
2. Install approximately four pipe diameters (first guide) and 14 diameters (second guide) away from each end of expansion joints. Do not use as supports. Provide in addition to other required pipe hangers and supports.

CC. Heavy-Duty Steel Trapeze Installation:

1. Arrange for grouping of parallel runs of horizontal piping and support together on field fabricated, heavy-duty trapezes.
2. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
3. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D-1.1.

DD. Group parallel runs of horizontal piping to be supported together on trapeze-type hangers. Maximum spacings: MSS SP-58.

EE. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe.

FF. Do not support piping from other piping.

GG. Fire protection piping will be supported independently of other piping.

HH. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated.

II. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping" is not exceeded.

JJ. Insulated Piping:

1. Attach clamps and spacers to piping.
    a. Piping Operating Above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating Below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
2. Do not exceed pipe stress limits according to ASME B31.9.
3. Install MSS SP-58, Type 39 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
4. Install MSS SP-58, Type 40 protective shields on cold piping with vapor barrier. Shields to span arc of 180 degrees.

5. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.
6. Shield Dimensions for Pipe, not less than the following:

    a. NPS 1/4 to NPS 3-1/2 (DN8 to DN 90): 12-inches long and 0.048-inch thick.
    b. NPS 4 (DN100): 12-inches long and 0.06-inch thick.
    c. NPS 5 and NPS 6 (DN125 and DN150): 18-inches long and 0.06-inch thick.
    d. NPS 8 to NPS 14 (DN200 to DN350): 24-inches long and 0.075-inch thick.
    e. NPS 16 to NPS 24 (DN400 to DN600): 24-inches long and 0.105-inch thick.

7. Pipes NPS 8 (DN200) and Larger: Include wood inserts.

    a. Insert Material: Length at least as long as protective shield.

8. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

KK. Pipe Anchors: Provide anchors to fasten piping which is subject to expansion and contraction, and adjacent to equipment to prevent loading high forces onto the equipment.

LL. Escutcheon Plates: Install around horizontal and vertical piping at visible penetrations through walls, partitions, floors, or ceilings, including penetrations through closets, through below ceiling corridor walls, and through equipment room walls and floors.

MM. Vertical Piping:

1. Support with U-clamps fastened to wall to hold piping away from wall unless otherwise approved.
2. Riser clamps to be directly under fitting or welded to pipe.

    a. Riser to be supported at each floor of penetration.
    b. Provide structural steel supports at the base of pipe risers. Size supports to carry forces exerted by piping system when in operation.

NN. Piping Above Roof:

1. Design a complete system unless specific details have been shown on Drawings.
2. Provide calculations signed and stamped by a Structural Engineer, registered in the State where the project is located at, as part of submittals and coordinated shop drawings.
3. Do not use freestanding supports unless approved by the Structural Engineer of Record.
4. Provide miscellaneous metal and materials as specified in Miscellaneous Metal and Materials article, above.

3.03 WALL AND FLOOR SLEEVES

A. "Link-Seal" Pipe Sleeves: Install at floor/below grade piping penetrations. Provide manufacturer's sleeve appropriate to seal type for pre-cast penetrations.

B. Fabricated Pipe Sleeves:

1. Provide either steel or sheet metal pipe sleeves accurately centered around pipe routes. Size such that piping and insulation, if any, will have free movement within the sleeve, including allowance for thermal expansion. Sleeve diameter to be determined by local seismic clearance requirements, and by waterproofing requirements.
2. Length: Equal to thickness of construction penetrated, except extend floor sleeves 1-inch above floor finish.
3. Provide temporary support of sleeves during placement in concrete and other work around sleeves. Provide temporary end closures to prevent concrete and other materials from entering pipe sleeves.
4. Seal each end airtight with a resilient nonhardening sealer, UL listed, fire rated ASTM 814.

C. Installation of metallic or plastic piping penetrations through non fire-rated walls and partitions and through smoke-rated walls and partitions:

1. Install fabricated pipe sleeve.
2. After installation of sleeve and piping, tightly pack entire annular void between piping or piping insulation and sleeve identification with specified material.
3. Seal each end airtight with a resilient nonhardening UL listed fire resistant ASTM 814.

3.04 BUILDING ATTACHMENTS

A. Factory fabricated attachments complying with MSS SP-58, selected to suit building substructure conditions and in accordance manufacturer's published product information.

B. Select size of building attachments to suit hanger rods.

C. Space attachments within maximum piping span length indicated in MSS SP-58.

D. Install building attachments within concrete slabs or attach to structural steel or wood. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping.

E. Attachment to Wood Structure: Anvil side beam bracket Figure 202 for attachment to wooden beam or approved attachment for a wood structure.

F. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

G. Install concrete inserts before concrete is placed; fasten inserts to forms. Where concrete with compressive strength less than 2500 PSI is indicated, install reinforcing bars through openings at top in inserts.

H. Install powder-actuated drive-pin fasteners in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual. Test powder-actuated insert attachments with a minimum load of 100 pounds.

I. Do not use powder-actuated concrete fasteners for lightweight aggregate concretes or for slabs less than 4-inches thick.

J. Bolting: Provide bored, drilled or reamed holes for bolting to miscellaneous structural metals, frames or for mounts or supports. Flame cut, punched or hand sawn holes will not be accepted.

K. Anchor Bolts:

1. Install anchor bolts for mechanical equipment, piping and ductwork as required. Tightly fit and clamp base-supported equipment anchor bolts at equipment support points. Provide locknuts where equipment, piping and ductwork are hung.
2. Anchor Bolts (Cast-In-Place): Embed anchor bolts in new cast-in-place concrete to anchor equipment. Install a pipe sleeve around the anchor bolt for adjustment of the top 1/3 of the bolt embedment; sizes and patterns to suit the installation conditions of the equipment to be anchored.

3.05 FLASHING

A. Flash and counterflash where piping, ductwork and equipment passes through weather or waterproofed walls, floors, and roofs.

3.06 MISCELLANEOUS METAL AND MATERIALS

A. General: Verify dimensions prior to fabrication. Form metal items to accurate sizes and configurations as indicated on drawings and otherwise required for proper installation; make with lines straight and angles sharp, clean and true; drill, countersink, tap, and otherwise prepare items for connections with work of other trades, as required. Fabricate to detail of structural shapes, plates and bars; weld joints where practicable; provide bolts and other connection devices required. Include anchorages; clip angles, sleeves, anchor plates, and similar devices. Hot dipped galvanize after fabrication items installed in exterior locations. Set accurately in position as required and anchor securely to building construction. Construct items with joints formed for strength and rigidity, accurately machining for proper fit; where exposed to weather, form to exclude water.

B. Finishes:

1. Ferrous Metal: After fabrication, but before erection, clean surfaces by mechanical or chemical methods to remove rust, scale, oil, corrosion, or other substances detrimental to bonding of subsequently applied protective coatings. For metal items exposed to weather or moisture, galvanize in manner to obtain G90 zinc coating in accordance with ASTM A123. Provide other non-galvanized ferrous metal with 1 coat of approved rust-resisting paint primer, in manner to obtain not less than 1.0 mil dry film thickness. Touch-up damaged areas in primer with same material, before installation. Apply zinc coatings and paint primers uniformly and smoothly; leave ready for finish painting as specified elsewhere.
2. Metal in Contact with Concrete, Masonry and Other Dissimilar Materials: Where metal items are to be erected in contact with dissimilar materials, provide contact surfaces with coating of an approved zinc-chromate primer in manner to obtain not less than 1.0 mil dry film thickness, in addition to other coatings specified in these specifications.

3. For Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

C. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required. Avoid cutting concrete reinforcing when drilling for inserts. Reference structural drawings and reinforcing shop drawings and determine locations of stirrups prior to drilling into concrete.

E. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items, which are to be built into concrete masonry or similar construction.

F. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

G. Setting Loose Plates: Clean concrete and masonry bearing surfaces of any bond reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

H. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut-off flush with edge of the bearing plate before packing with grout. Use metallic non-shrink grout in concealed locations where not exposed to moisture; use non-metallic non-shrink grout in exposed locations, unless otherwise indicated.

I. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

J. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

K. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.

L. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and 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. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

M. Provide galvanized components for items exposed to weather.

END OF SECTION

SECTION 230553 – IDENTIFICATION FOR HVAC PIPING, DUCTWORK AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Plastic Nameplates
2. Tags
3. Plastic Pipe Markers
4. Ceiling Tags

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Submit schedule of identification type, including material, for each class of tagged item.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required.
2. Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices unless otherwise indicated.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 PLASTIC NAMEPLATES

A. Manufacturers:

1. Brady Corporation
2. Brimar
3. Champion America
4. Craftmark
5. Seton

B. Description: Engraving stock melamine plastic laminate in the size and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color), punched for mechanical fastening except where adhesive mounting is necessary because of substrate. Provide 1/8-inch thick material.

1. Letter Color: White.
2. Letter Height: 1/2-inch.
3. Background Color: Black.
4. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.
5. Access Panel Markers: Manufacturer's standard 1/16-inch thick engraved plastic laminate access panel markers, with abbreviations and numbers corresponding to concealed valve or devices/equipment. Include center hole to allow attachment.

2.02 TAGS

A. Manufacturers:

1. Brady Corporation
2. Brimar
3. Champion America
4. Craftmark
5. Seton

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 2-inch diameter.

C. Metal Tags: Polished Brass with stamped letters; tag size minimum 2-inch diameter with smooth edges.

D. Warning Tags: Preprinted or partially preprinted, accident-prevention tags; of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7-inches.
2. Fasteners: Brass grommet and wire.
3. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
4. Color: Yellow background with black lettering.

2.03 PLASTIC PIPE MARKERS

A. Manufacturers:

1. Brady Corporation
2. Brimar
3. Champion America
4. Craftmark
5. Seton

B. Color: Conform to ASME A13.1 and ANSI Z535.1.

C. Plastic Pipe Markers (for external diameters of 6-inches and larger including insulation): Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers (for external diameters less than 6-inches including insulation): Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Minimum information indicating flow direction arrow and identification of fluid being conveyed.

E. Lettering:

1. 3/4-inch to 1-1/4-inch Outside Diameter of Insulation or Pipe: 8-inch long color field, 1/2-inch high letters.
2. 1-1/2-inch to 2-inch Outside Diameter of Insulation or Pipe: 8-inch long color field, 3/4-inch high letters.
3. 2-1/2-inch to 6-inch Outside Diameter of Insulation or Pipe: 12-inch long color field, 1-1/4-inch high letters.
4. 8-inch to 10-inch Outside Diameter of Insulation or Pipe: 24-inch long color field, 2-1/2-inch high letters.
5. Over 10-inch Outside Diameter of Insulation or Pipe: 32-inch long color field, 3-1/2-inch high letters.

2.04 CEILING TAGS

A. Manufacturers:

1. Brady Corporation

2. Brimar
3. Champion America
4. Craftmark
5. Seton

B. Description: Steel with 3/4-inch diameter color coded head.

C. Color code as follows:

1. Yellow – HVAC equipment.
2. Red – Fire dampers/smoke dampers.
3. Blue – Heating/cooling valves.
4. Ceiling tile labels, machine generated, adhesive backed tape labels with black letters, clear tape.

PART 3 - EXECUTION

3.01 GENERAL – INSTALLATION

A. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates riveted to equipment body.

B. Identify piping, concealed or exposed, with plastic pipe markers.

C. Coordinate names, abbreviations and other designations used in mechanical identification work with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of mechanical systems and equipment.

D. Multiple Systems: Where multiple systems of same generic name are shown and specified, provide identification which indicates individual system number as well as service (as examples: Chiller No. 3, Air Handling Unit No. 42, Standpipe F12, and the like).

E. Degrease and clean surfaces to receive adhesive for identification materials.

F. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

G. Install all products in accordance with manufacturer's instructions.

H. Manual Balancing Dampers: Provide 12-inch long orange marker ribbon to end of balancing damper handle.

3.02 PLASTIC NAMEPLATES

A. Install plastic nameplates with corrosive-resistant mechanical fasteners.

B. Identify control panels and major control components outside panels with plastic nameplates riveted to equipment body.

C. Identify thermostats with nameplates.

3.03 TAGS

A. Use metal tags on piping 3/4-inch diameter and smaller.

B. Tag balancing valves and major dampers with balanced GPM or CFM indicated after balancing is completed and accepted.

C. Install tags with corrosion resistant chain.

D. Identify air terminal units with numbered plastic tags.

E. Tag automatic controls, instruments, and relays. Key to control schematic.

3.04 PLASTIC PIPE MARKERS

A. Install plastic pipe markers complete around pipe in accordance with manufacturer's instructions.

B. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20-feet (reduced to 10-feet in congested areas and mechanical equipment rooms) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction. Locate near branches, valves, control devices, equipment connections, access doors, floor/wall penetrations.

3.05 CEILING TAGS

A. Provide ceiling tags to locate valves, dampers, and equipment above accessible ceilings. Locate in corner of ceiling tee grid closest to equipment.

END OF SECTION

SECTION 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. General Requirements and Procedures
2. Ductwork Pressure Testing
3. Fundamental Air Systems Balancing Procedures
4. Temperature Control Verification
5. Constant Volume Air Systems Balancing Procedures
6. Pre-Balance Reporting
7. Final Reports:

    a. Report Requirements
    b. General Report Data
    c. System Diagrams
    d. Air Handling Units
    e. Fans
    f. Duct Traverses
    g. Diffusers/Registers/Grilles
    h. Instrument Calibration

8. Additional Tests

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Quality-Assurance Submittals: Submit two copies of evidence that the Testing, Adjusting, and Balancing (TAB) Agent and Project's TAB team members meet the qualifications specified in the "Quality Assurance" Article below.

2. Pre-Construction Phase Report:

    a. Provide a pre-construction phase TAB Plan at least two weeks prior to the commencement of TAB work. This report is to include:

        1) A complete set of report forms intended for use on the Project, with data filled in except for the field readings. Forms to be Project-specific.
        2) Marked up shop drawings identifying all HVAC equipment to be balanced, and associated outlets and terminal devices.
        3) Identification of the type, manufacturer, and model of the actual instruments to be used, and clear indication of which instrument will be used to take each type of reading. Calibration certifications to be included.
        4) A narrative of Project-specific and/or non-standard TAB procedures to be used, and the equipment or systems to which they apply.

3. Contract Documents Examination Report: Within 45 days from the Contractor's Notice to Proceed, submit two copies of the Contract Documents review report as specified in Part 3 of this Section.
4. Strategies and Procedures Plan: Submit two copies of the TAB strategies and step-by-step procedures as specified in Part 3 of this Section. Include a complete set of report forms intended for use on this Project.
5. Specify reports required because of editing procedures in Part 3 of this Section.
6. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by the TAB Agent.
7. Sample Report Forms: Submit two sets of sample TAB report forms.
8. Test Instrument Calibration: Submit proof of calibration within the last 6 months.
9. Final Report.
10. Provide additional submittals to commissioning authority as dictated in Commissioning Specifications.

1.05 QUALITY ASSURANCE

A. Quality Assurance as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Balance Firm Qualifications:

    a. General:

        1) Procure services of independent TAB agency to balance, adjust and test water circulating and air moving equipment and air distribution or exhaust systems. Minimum experience: 5 years.
        2) Provide proof of testing agency having successfully completed at least five projects of similar size and scope.

    b. Testing and Balancing firm is certified by NEBB or AABC and has a NEBB Certified Professional (CP) or a AABC Test and Balancer Engineer (TBE) on staff.

c. Industry Standards: Testing and Balancing will conform to NEBB or AABC, and American National Standards Institute (ANSI) as follows:

1) NEBB: Comply with Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
2) AABC: Comply with National Standards for Total System Balance.
3) ANSI:

(a) S1.4 Specifications for sound level meters.
(b) S1.11 Specifications for Octave-Band and Fractional-Octave-Band analog and digital filters.
(c) ANSI S1.13 Methods for the Measurement of Sound Pressure Levels.

d. Test Observation: If requested, conduct tests in the presence of the Commissioning Authority, AHJ, Architect or the Architect's representative.

2. Code Compliance: Perform tests in the presence of the Authority Having Jurisdiction (AHJ) where required by the Authority Having Jurisdiction (AHJ).
3. Owner Witness: Perform tests in the presence of the Commissioning Authority, Architect, Architect's Representative, or Owner's representative.
4. Engineer Witness: The engineer or engineer's representative reserves the right to observe tests or selected tests to assure compliance with the specifications.
5. Simultaneous Testing: Test observations by the AHJ, the Owner's Authorized Representative and the engineer's representative need not occur simultaneously.
6. Do not perform TAB work until heating, ventilating, and air conditioning equipment has been completely installed and is operating continuously as required.
7. Conduct air testing and balancing with clean filters in place. Clean strainers prior to performing hydronic testing and balancing.
8. TAB Conference: Meet with the Commissioning Authority, Owner's and the Architect's representatives on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls Installer, and other support personnel. Provide 7 days advance notice of scheduled meeting time and location.

a. Agenda Items: Include at least the following:

1) Submittal distribution requirements.
2) Contract Documents examination report.
3) TAB plan.
4) Work schedule and Project site access requirements.
5) Coordination and cooperation of trades and subcontractors.
6) Coordination of documentation and communication flow.

9. Certification of TAB Reports: This certification includes the following:

a. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
b. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

10. TAB Reports: Use standard forms from NEBB or AABC.
11. Instrumentation Type, Quantity, and Accuracy: As described in NEBB or AABC.
12. Instrumentation Calibration: Calibrate instruments at least every 6 months or more frequently if required by the instrument manufacturer.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. TAB Agency provides warranty for a period of 90 days following submission of completed report, during which time, Owner may request a recheck of up to 10 percent of total number of terminals, or resetting of outlet, coil, or device listed in the final TAB report.
2. Guarantee: Meet the requirements of the following programs:

a. Provide a guarantee on NEBB or AABC forms stating that the agency will assist in completing the requirements of the Contract Documents if the TAB Agent fails to comply with the Contract Documents. Guarantee includes the following provisions:

1) The certified Agent has tested, adjusted, and balanced systems according to the Contract Documents.
2) Systems are balanced to optimum performance capabilities within design and installation limits.

1.07 DEFINITIONS

A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to design quantities.

C. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.

D. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

E. Report Forms: Test data sheets for recording test data in logical order.

F. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

G. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

H. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

I. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.

J. TAB: Testing, Adjusting, and Balancing.

K. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

L. Test: A procedure to determine quantitative performance of a system or equipment.

M. Testing, Adjusting, and Balancing (TAB) Agent: The entity responsible for performing and reporting the TAB procedures.

N. AABC: Associated Air Balance Council.

O. NEBB: National Environmental Balancing Bureau.

P. AMCA: Air Movement and Control Association.

Q. CTI: Cooling Tower Institute.

R. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.08 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

B. Notice: Provide 7 days advance notice for each test. Include scheduled test dates and times.

C. Witness leakage and pressure tests carried out by Section 23 31 00, HVAC Ducts and Casings.

D. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS AND PROCEDURES

A. Project Conditions:

1. Partial Owner Occupancy: The Owner may occupy completed areas of the building before Substantial Completion. Cooperate with the Owner during TAB operations to minimize conflicts with the Owner's operations.

B. General Requirements:

1. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and controls, coordinate scheduling and testing and inspection procedures with authorities having jurisdiction.
2. Perform TAB work with doors, closed windows, and ceilings installed etc., to obtain simulated or project operating conditions. Do not proceed until systems scheduled for TAB are clean and free from debris, dirt and discarded building materials.
3. Where Owner occupies building during the testing period, cooperate with Owner to minimize conflicts with Owner's operations.

C. Examination:

1. Examine Contract Documents to become familiar with project requirements and existing building record documents (if available) to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

    a. Contract Documents are defined in the General and Supplementary Conditions of the Contract.
    b. Verify that balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

2. Examine approved submittal data of HVAC systems and equipment.
3. Examine Project record documents described in Division 01, General Requirements.
4. Examine Architect's and Engineer's design data, including Basis of Design, HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
5. Examine equipment performance data, including fan and pump curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce the performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
6. Coordinate requirements in system and equipment with this Section.
7. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Specification Sections have been performed.
8. Examine system and equipment test reports.
9. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices,

balancing valves and fittings, and manual volume dampers, are properly installed, and their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.

10. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
11. Examine equipment for installation and for properly operating safety interlocks and controls.
12. Report deficiencies discovered before and during performance of TAB procedures.

D. Preparation:

1. Prepare a TAB plan that includes strategies and step-by-step procedures.
2. Complete system readiness checks and prepare system readiness reports. Verify the following:

    a. Permanent electrical power wiring is complete.
    b. Hydronic systems are filled, clean, and free of air.
    c. Automatic temperature-control systems are operational.
    d. Equipment and duct access doors are securely closed.
    e. Balance, smoke, and fire dampers are open.
    f. Isolating and balancing valves are open and control valves are operational.
    g. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
    h. Windows, doors and other portions of the building envelope can be closed so design conditions for system operations can be met.

3. Hold a pre-balancing meeting at least one week prior to starting TAB work.

    a. Attendance is required by installers whose work will be tested, adjusted, or balanced.

4. Provide instruments required for TAB operations. Make instruments available to Architect to facilitate spot checks during testing.

E. General TAB Procedures:

1. Perform TAB procedures on each system according to the procedures contained in NEBB or AABC and this Section.
2. Coordinate location of test probes prior to start of TAB procedures and make test probes available for Owner's tests after start of occupancy. Where required, cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to the insulation Specifications for this Project.
3. Mark equipment settings with paint or other suitable, permanent identification material, including damper-control positions, valve indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

F. Adjustment Tolerances:

1. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 5 percent of design for return and exhaust systems.
2. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
3. Hydronic Systems: Adjust to within plus or minus 10 percent of design at coils and plus or minus 5 percent at system pumps and equipment.
4. Adjust supply, return, and exhaust air quantities to maintain pressurization in spaces indicated on Drawings. Note and document room-to-room pressurization and maintain these relationships. Adjust pressure controlled spaces to within plus or minus 0.01 in WC.

G. Recording and Adjusting:

1. Field Logs: Maintain written logs including:

   a. Running log of events and issues.
   b. Discrepancies, deficient or uncompleted work by others.
   c. Contract interpretation requests.
   d. Lists of completed tests.

2. Ensure recorded data represents actual measured or observed conditions.
3. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
4. Mark on drawings locations where traverse and other critical measurements were taken and cross reference location in final report.
5. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
6. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
7. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Owner's Authorized Representative, or Commissioning Agent.

3.02 DUCTWORK PRESSURE TESTING

A. Test ductwork prior to connection to fan equipment. Repair leaks and retest until stipulated results are achieved.

B. Provide air pressure testing of ductwork as noted below for various project types and systems:

1. Supply and return ductwork located inside shafts and outside building envelope.
2. Exhaust ductwork located inside shafts.
3. Exhaust ductwork located outside building envelope, when used in a heat recovery system.
4. For low-rise and high-rise multi-family, and single-residence Dwelling Units: not required.
5. Exhaust systems serving compounding pharmacies, laboratories, laboratory support spaces, fume hoods, bio-safety cabinets, or hazardous exhausts: pressure test all ductwork.

6. For other project types or systems: pressure test ductwork in accordance with SMACNA HVAC Air Duct Leakage Test Manual, of representative sections of installed ductwork totaling not less than the total installed duct areas noted below:

    a. For variable air volume supply, return, or exhaust air systems' ductwork of higher than 2-inches pressure class: pressure test 40 percent of the total installed duct area.
    b. For variable air volume supply, return, or exhaust air systems' ductwork of 2-inches or less pressure class: pressure test ductwork connected to 10-percent of the total installed duct area of such ductwork, but not less than ductwork connected to two terminal units. Where the tested 10-percent fails to comply, then pressure test 40-percent of the total installed duct area.
    c. For constant air volume supply, return, or exhaust systems: pressure test 40-percent of the total installed duct area.

7. Where tests are required, provide separate tests for each of supply, return and exhaust air systems.
8. Where the tested 40-percent fails to comply with the requirements of this section, then pressure test 100-percent of the total installed duct area. Sections shall be selected by the building owner or the Architect and shall include sections of ductwork upstream and downstream of terminal units. Positive pressure leakage testing may be utilized for negative pressure ductwork.
9. Area requirement of 40-percent of the total installed duct area is inclusive of ductwork located in shafts or outside building envelope.

C. Test ductwork prior to connection to fan equipment. Repair leaks and retest until stipulated results are achieved. Pressure testing to meet the following leakage classifications below as a minimum (2012 SMACNA HVAC Air Duct Leakage Manual, Table 4-1):

1. Leakage class to be as defined below as a minimum.

    a. Minimum Duct Leakage Classification

Duct Type	**Leakage Class**
Metal (Flexible excluded)	
Round and flat oval	3
Rectangular	6

2. Testing machine: Meet requirements of SMACNA standards. Pacific Air Products "Port-O-Lab", Rolok, or United Sheet Metal
3. Test supply systems prior to connecting terminal units.
4. Perform tests in presence of Owner's Authorized Representative. Give 48 hours advance notice before commencement of each test.
5. Test ductwork systems in sections as large as possible and record test results accordingly.
6. Leak test grease exhaust ductwork per requirements of latest edition of NFPA-96 and local Mechanical Code.
7. Coordinate testing with ceiling installation.

    a. Provide sheet-metal plates and install between each duct test section (applies to main-to-main fittings, branch-to-branch fittings and main-to-branch fittings). At

each plate location, fabricate joint with Ductmate. Insert 14 gauge sheet metal between Ductmate using a neoprene gasket on both sides of metal plate.

b. Leave plates in place until isolated section has been tested and approved by Owner's Authorized Representative.

c. Once sections have passed test, remove plates and reattach Ductmate joints. After fan unit is running, test joint for leakage by using a mixture of soap and water. If noise or bubbling occurs, reseal joint. Owner's Authorized Representative to witness this procedure.

8. Test duct at 1.5 times the design air pressure, up to pressure class of the duct. Seal audible leaks.

3.03 FUNDAMENTAL AIR SYSTEMS BALANCING PROCEDURES

A. Examine air-handling equipment to ensure clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

B. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

C. Prepare test reports for both fans and inlets and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross check the summation of required outlet volumes with required fan volumes.

D. Prepare schematic diagrams of systems' "as-built" duct layouts.

E. Determine the best locations in main and branch ducts for accurate duct airflow measurements.

F. Check the airflow patterns from the outside-air louvers and dampers and the return-air and exhaust-air dampers, through the supply-fan discharge and mixing dampers.

G. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

H. Verify that motor starters are equipped with thermal protection, sized for the connected load.

I. Check dampers for proper position to achieve desired airflow path.

J. Check for airflow blockages.

K. Check that condensate drains are installed, trapped and primed and routed to drain.

L. Check for readily observable leaks in air-handling unit components and ductwork.

3.04 TEMPERATURE CONTROL VERIFICATION

A. Examine automatic temperature system components to verify the following:

1. Dampers, valves, and other controlled devices operate by the intended controller.
2. Dampers and valves are in the position indicated by the controller.

3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
4. Automatic modulating and shutoff valves, including 2-way valves and 3-way mixing and diverting valves, are properly connected.
5. Thermostats and humidistats are located to avoid adverse effects of sunlight, equipment, drafts, and cold walls.
6. Sensors are located to sense only the intended conditions.
7. Sequence of operation for control modes is according to the Contract Documents.
8. Controller set points are set at design values. Observe and record system reactions to changes in conditions. Record default set points if different from design values.
9. Interlocked systems are operating.
10. Changeover from heating to cooling mode occurs according to design values.

B. Verify that controllers are calibrated and commissioned.

C. Check transmitter and controller locations and note conditions that would adversely affect control functions.

D. Record controller settings and note variances between set points and actual measurements.

E. Verify operation of limiting controllers (i.e., high- and low-temperature controllers).

F. Verify free travel and proper operation of control devices such as damper and valve operators.

G. Verify sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water-flow measurements. Note the speed of response to input changes.

H. Confirm interaction of electrically operated switch transducers.

I. Confirm interaction of interlock and lockout systems.

J. Verify main control supply-air pressure and observe compressor and dryer operations.

K. Note operation of electric actuators using spring return for proper fail-safe operations.

3.05 CONSTANT VOLUME AIR SYSTEMS BALANCING PROCEDURES

A. Adjust fans to deliver total design airflows within the maximum allowable rpm listed by the fan manufacturer. Adjust fans to deliver design airflow at the lowest possible speed.

1. Measure fan static pressures to determine actual static pressure as follows:

a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
b. Measure static pressure directly at the fan outlet or through the flexible connection.
c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.

d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

2. Measure static pressure across each air-handling unit component under final balanced condition.
3. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Recommend corrective action to align design and actual conditions.
4. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
5. Do not make fan-speed adjustments that result in motor loading greater than full load amps. Do not increase fan speed beyond fan class rating. Modulate dampers and measure fan-motor amperage to ensure no overload will occur. Measure amperage in full cooling, full heating, and economizer modes to determine the maximum required brake horsepower.
6. Adjust volume dampers for main duct, submain ducts, and major branch ducts to design airflows within specified tolerances.
7. Calibrate airflow measuring stations.

3.06 PRE-BALANCE REPORTING

A. Pre-Construction Phase Report:

1. Provide a pre-construction phase TAB Plan at least 2 weeks prior to the commencement of TAB work. This report is to include:

a. A complete set of report forms intended for use on the Project, with all data filled in except for the field readings. Forms to be Project-specific.
b. Marked up shop drawings identifying all HVAC equipment to be balanced, and associated outlets and terminal devices.
c. Identification of the type, manufacturer, and model of actual instruments to be used, and clear indication of which instrument will be used to take each type of reading. Calibration certifications are to be included.
d. A narrative of Project-specific and/or non-standard TAB procedures to be used, and the equipment or systems they apply to.

B. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article above, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

C. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced.

3.07 FINAL REPORTS

A. Report Requirements:

1. General:

a. Computer generated in PDF format and tabulated, divided, and bookmarked into sections by tested and balanced systems.
b. Include a certification sheet in front of binder signed and sealed by the certified TAB engineer.

1) Include a list of the instruments used for procedures, along with proof of calibration.

c. Final Report Contents: In addition to the certified field report data, include the following:

1) Pump curves
2) Fan Curves
3) Manufacturers Test Data
4) Field test reports prepared by system and equipment installers
5) Other information relative to equipment performance, but do not include approved Shop Drawings and Product Data

B. General Report Data:

1. In addition to the form titles and entries, include the following data in the final report, as applicable:

a. Title Page
b. Name and Address of TAB Agent
c. Project Name
d. Project Location
e. Architect's Name and Address
f. Engineer's Name and Address
g. Contractor's Name and Address
h. Report Date
i. Signature of TAB Agent who Certifies the Report
j. Summary of Contents, Including the Following:

1) Design versus Final Performance
2) Notable Characteristics of Systems
3) Description of System Operation Sequence if it varies from the Contract Documents

k. Nomenclature Sheets for Each Item of Equipment
l. Data for Terminal Units, including Manufacturer, Type Size, and Fittings
m. Notes to explain why certain final data in the body of reports vary from design values.
n. Test Conditions for Fans and Pump Performance Forms, Including the Following:

1) Settings for Outside-, Return-, and Exhaust-air Dampers
2) Conditions of Filters
3) Cooling Coil, Wet- and Dry-bulb Conditions
4) Face and Bypass Damper Settings at Coils
5) Fan Drive Settings, including Settings and Percentage of Maximum Pitch Diameter
6) Inlet Vane Settings for Variable-Air-Volume Systems
7) Settings for Supply-air, Static-pressure Controller
8) Other System Operating Conditions that affect Performance

C. System Diagrams:

1. Include schematic layouts of air and hydronic distribution systems. Present with single-line diagrams and include the following:

   a. Quantities of Outside, Supply, Return, and Exhaust Airflows
   b. Water and Steam Flow Rates
   c. Duct, Outlet, and Inlet Sizes
   d. Pipe and Valve Sizes and Locations
   e. Terminal Units
   f. Balancing Stations

D. Air Handling Units:

1. For air-handling units, split systems, fan coils, pumps, and evaporator units with coils, include the following:

   a. Unit Data: Include the following:

      1) Unit Identification
      2) Location
      3) Make and Type
      4) Model Number and Unit Size
      5) Manufacturer's Serial Number
      6) Unit Arrangement and Class
      7) Discharge Arrangement
      8) Sheave Make, Size in inches, and Bore
      9) Sheave Dimensions, Center-to-center and Amount of Adjustments in Inches
      10) Number of Belts, Make, and Size
      11) Number of Filters, Type, and Size

   b. Motor Data: Include the following:

      1) Make and Frame Type and Size
      2) Horsepower and rpm
      3) Volts, Phase, and Hertz
      4) Full-load Amperage and Service Factor
      5) Sheave Make, Size in Inches, and Bore
      6) Sheave Dimensions, Center-to-center and Amount of Adjustments in Inches

   c. Test Data: Include design and actual values for the following:

1) Total Airflow Rate in cfm (L/s)
2) Total System Static Pressure in Inches wg (Pa)
3) Fan rpm
4) Discharge Static Pressure in Inches wg (Pa)
5) Filter Static-pressure Differential in Inches wg (Pa)
6) Preheat Coil Static-pressure Differential in Inches wg (Pa)
7) Cooling Coil Static-pressure Differential in Inches wg (Pa)
8) Heating Coil Static-pressure Differential in Inches wg (Pa)
9) Outside Airflow in cfm (L/s)
10) Return Airflow in cfm (L/s)
11) Outside-air Damper Position
12) Return-air Damper Position
13) Vortex Damper Position

E. Electric Coils:

1. For electric duct coils include the following:

a. Unit Data: Include the following:

1) System Identification
2) Location
3) Coil Identification
4) Capacity in Btuh
5) Number of Stages
6) Connected Volts, Phase, and Hertz
7) Rated Amperage
8) Airflow Rate in cfm
9) Face Area in SF
10) Minimum Face Velocity in fpm

b. Test Data: Include design and actual values for the following:

1) Heat Output in Btuh
2) Airflow Rate in cfm
3) Air Velocity in fpm
4) Entering-air Temperature in Degrees F
5) Leaving-air Temperature in Degrees F
6) Voltage at Each Connection
7) Amperage for Each Phase

F. Fans:

1. Fan Test Reports: For supply, return, and exhaust fans, include the following:

a. Fan Data: Include the following:

1) System Identification
2) Location
3) Make and Type
4) Model Number and Size

5) Manufacturer's Serial Number
6) Arrangement and Class
7) Sheave Make, Size in Inches, and Bore
8) Sheave Dimensions, Center-to-center and Amount of Adjustments in Inches

b. Motor Data: Include the following:

1) Make and Frame Type and Size
2) Horsepower and rpm
3) Volts, Phase, and Hertz
4) Full-load Amperage and Service Factor
5) Sheave Make, Size in Inches, and Bore
6) Sheave Dimensions, Center-to-center and Amount of Adjustments in Inches
7) Number of Belts, Make, and Size

c. Test Data: Include design and actual values for the following:

1) Total Airflow Rate in cfm
2) Total System Static Pressure in Inches wg
3) Fan rpm
4) Discharge Static Pressure in Inches wg
5) Suction Static Pressure in Inches wg

G. Duct Traverses:

1. Include a diagram with a grid representing the duct cross-section and record the following:

a. Report Data: Include the following:

1) System and Air-handling Unit Number
2) Location and Zone
3) Duct Static Pressure in Inches wg
4) Duct Size in Inches
5) Duct Area in SF
6) Design Airflow Rate in cfm
7) Design Velocity in fpm
8) Actual Airflow Rate in cfm
9) Actual Average Velocity in fpm

H. Diffusers/Registers/Grilles:

1. For diffusers, registers and grilles, include the following:

a. Unit Data: Include the following:

1) System and Air-handling Unit Identification
2) Location and Zone
3) Test Apparatus Used
4) Area Served
5) Air-terminal-device Make

6) Air-terminal-device Number from System Diagram
7) Air-terminal-device Type and Model Number
8) Air-terminal-device Size
9) Air-terminal-device Effective Area in SF

b. Test Data: Include design and actual values for the following:

1) Airflow Rate in cfm
2) Air Velocity in fpm
3) Final Airflow Rate in cfm
4) Final Velocity in fpm
5) Space Temperature in Degrees F

I. Instrument Calibration:

1. For instrument calibration, include the following:

a. Report Data: Include the following:

1) Instrument Type and Make
2) Serial Number
3) Application
4) Dates of Use

b. Dates of Calibration

3.08 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional inspections, testing, and adjusting during near-peak summer and winter conditions.

END OF SECTION

SECTION 230700 – HVAC INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Type A, Flexible Glass Wool Blanket
2. Type B, Duct Liner
3. Type F, Closed-Cell Polyisocyanurate Rigid Foam Board
4. Type 2, Flexible Elastomeric Pipe Insulation
5. Accessories
6. Duct Insulation Accessories
7. Duct Insulation Compounds

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Piping and duct insulation products to contain less than 0.1 percent by weight PBDE in all insulating materials.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Installer qualifications.
2. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any) for each type of product indicated.

    a. Where indicated R-values/ratings cannot be achieved by a single layer of insulation, describe how performance requirements will be achieved.

3. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of

insulation materials, sealers, attachments, cements, and jackets with requirements indicated. Include dates of tests.

4. Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.
5. Submit manufacturer's installation instructions.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Formaldehyde Free: Should be third-party certified with UL Environment Validation.
2. Recycled Content: A minimum of 40 percent post-consumer recycled glass content certified and UL validated.
3. Low Emitting Materials: For all thermal and acoustical applications of Glass Mineral Wool Insulation products, provide materials complying with the testing and products requirements of UL GREENGUARD Gold Certification.
4. Installer to have minimum 5 years' experience in the business of installing insulation.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

1.07 FIRE HAZARD CLASSIFICATION

A. Maximum fire hazard classification of the composite insulation construction as installed to be not more than a Flame Spread Index (FSI) of 25 and Smoke Developed Index (SDI) of 50 as tested by current edition of ASTM E84 (NFPA 255) method.

B. Test pipe insulation in accordance with the requirements of current edition of UL "Pipe and Equipment Coverings R5583 400 8.15."

C. Test duct insulation in accordance with current edition of ASTM E84, UL 723, NFPA 255, NFPA 90A and NFPA 90B.

PART 2 - PRODUCTS

2.01 TYPE A, FLEXIBLE GLASS WOOL BLANKET

A. Acceptable Manufacturers:

1. Certainteed
2. Johns Manville

3. Knauf
4. Owens-Corning

B. ASTM C553, Type 1, Class B-2; flexible blanket.

C. 'K' Value: 0.27 BTU*in/(hr*sf*F) at 75 degrees F installed, maximum service temperature: 250 degrees F.

D. Density: 0.75 pounds per cubic foot.

E. DBDE-free. UL/E validated to be formaldehyde-free.

F. Vapor Barrier Jacket: FSK aluminum foil reinforced with glass wool yarn and laminated to fire resistant Kraft, secured with UL listed pressure sensitive tape or outward clinched expanded staples and vapor barrier mastic as needed.

2.02 TYPE B, DUCT LINER

A. Acceptable Manufacturers:

1. Certainteed
2. Johns Manville
3. Knauf
4. Owens-Corning

B. ASTM C1071; flexible blanket.

C. 'K' Value: ASTM C518, 0.25 BTU*in/(hr*sf*F) at 75 degrees F, maximum service temperature: 250 degrees F.

D. Noise Reduction Coefficient: 0.65 or higher based on ASTM C 423 "Type A mounting."

E. Maximum Velocity on Mat or Coated Air Side: 5,000 FPM.

F. Adhesive: UL listed waterproof type.

G. Fasteners: Duct liner galvanized steel pins, welded or mechanically fastened.

H. Erosion-Resistant Surfaces: UL 181.

I. ASTM G21 and ASTM G22 Microbial Growth Resistance.

J. UL GREENGUARD Certified does not support the growth of mold, fungi, or bacteria per ASTM C 1338 and meets UL Environment GREENGUARD Microbial Resistance Listing per UL 2824-“GREENGUARD Certification Program Method for Measuring Microbial Resistance.” DBDE-free. UL/E validated to be formaldehyde-free.

2.03 TYPE F, CLOSED-CELL POLYISOCYANURATE RIGID FOAM BOARD

A. Acceptable Manufacturers:

1. Johns Manville
2. Certainteed
3. Knauf
4. RMax

B. ASTM C1289, Type 1, Class 1.

C. Thermal Conductivity: 0.16 BTU*in/(hr*sf*F).

D. Service Temperature: -100 degrees F to 250 degrees F.

E. Jacketing: 0.016-inch thick multi-layered laminate with minimum tensile strength of 149-lb/inch, minimum puncture resistance of 49 pounds per ASTM D1000, maximum emittance of 0.03 per ASTM C1371, maximum WVTR of 0.00 perm per ASTM E96, and min/max service temperature of -40 degrees F to 300 degrees F, as manufactured by 3M, VentureClad1579GCW-E.

2.04 TYPE 2, FLEXIBLE ELASTOMERIC PIPE INSULATION

A. Acceptable Manufacturers:

1. Insulation:

   a. Armacell LLC Armaflex
   b. K-Flex
   c. Or approved equivalent.

2. Glue:

   a. Armacell LLC Armaflex Low VOC Adhesive
   b. K-Flex
   c. Or approved equivalent.

3. Paint:

   a. Armacell LLC Armaflex
   b. K-Flex
   c. Or approved equivalent.

B. Elastomeric Foam: ASTM C534; flexible, cellular elastomeric, molded or sheet.

1. Thermal Conductivity Value: As indicated in the insulation tables below.
2. Maximum Service Temperature of 220 degrees F.
3. Maximum Flame Spread: 25.
4. Maximum Smoke Developed: 50 (1-inch thick and below).
5. Vapor Retarder Jacket, for over 1-inch insulation thickness: White Kraft paper reinforced with glass wool and bonded to aluminum foil, secure with self-sealing longitudinal laps and butt strips or vapor barrier mastic.
6. Connection: Waterproof vapor retarder adhesive as needed.
7. UV Protection: UV outdoor protective coating per manufacturer's requirements.

C. Glue: Contact adhesive specifically manufactured for cementing flexible elastomeric foam.

D. Paint (for exterior insulation only): Nonhardening high elasticity type, specifically manufactured as protective covering of flexible elastomeric foam insulation for prevention of degradation due to exposure to sunlight and weather.

2.05 ACCESSORIES

A. Acceptable Manufacturers:

1. ITW Insulation Systems
2. Or approved equivalent.

B. Equipment Insulation Jacketing: Presized glass cloth, not less than 7.8 ounces/sq.yd., except as otherwise indicated. Coat with gypsum based cement.

C. Equipment Insulation Compounds: Provide adhesives, cement, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated.

D. General: Provide staples, bands, wire, wire netting, tape corner angles, anchors, stud pins and metal covers as recommended by insulation manufacturer for applications indicated. Accessories, i.e., adhesives, mastics, cements and tape to have the same flame and smoke component ratings as the insulation materials with which they are used. Shipping cartons to bear a label indicating that flame and smoke ratings do not exceed those listed above. Provide permanent treatment of jackets or facings to impart flame and smoke safety. Provide non-water-soluble treatments. Provide UV protection recommended by manufacturer for outdoor installation.

2.06 DUCT INSULATION ACCESSORIES

A. Acceptable Manufacturers:

1. Certainteed
2. Johns Manville
3. Owens-Corning

B. Staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.

2.07 DUCT INSULATION COMPOUNDS

A. Acceptable Manufacturers:

1. Certainteed
2. Johns Manville
3. Owens-Corning

B. Cements, adhesives, coatings, sealers, protective finishes and similar accessories as recommended by insulation manufacturer for applications indicated. Comply with South Coast Air Quality Management District (SCAQMD) Rule #1168 in accordance with LLE EQ 4.1.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Verification of Conditions:

1. Do not apply insulation until pressure testing and inspection of ducts and piping has been completed.
2. Examine areas and conditions under which duct and pipe insulation will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Preparation: Clean and dry surfaces to be insulated.

C. Installation:

1. Insulation: Continuous through walls, floors and partitions except where noted otherwise.
2. Piping and Equipment:

    a. Install insulation over clean, dry surfaces with adjoining sections firmly butted together and covering surfaces. Fill voids and holes. Seal raw edges. Install insulation in a manner such that insulation may be split, removed, and reinstalled with vapor barrier tape on strainer caps and unions. Do not install insulation until piping has been leak tested and has passed such tests. Do not insulate manholes, equipment manufacturer's nameplates, handholes, and ASME stamps. Provide beveled edge at such insulation interruptions. Repair voids or tears.

D. Cover insulation on exposed refrigerant piping above ground, outside of building with heavy duty multi-layered laminated jacketing tape. Position seams on bottom of pipe. Use 3M VentureClad Plus 1579GCW-E or approved equal.

E. Provide accessories as required. See Part 2 Article "Accessories" above.

F. Protection and Replacement: Installed insulation during construction. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

G. Labeling and Marking: Provide labels, arrows and color on piping and ductwork. Attach labels and flow direction arrows to the jacketing per Section 23 05 53, Identification for HVAC Piping, Ductwork and Equipment.

H. Ductwork:

1. Install insulation in conformance with manufacturer's recommendations to completely cover duct.
2. Butt insulation joints firmly together and install jackets and tapes smoothly and securely.

3. Apply duct insulation continuously through sleeves and prepared openings, except as otherwise specified. Apply vapor barrier materials to form complete unbroken vapor seal over insulation.
4. Coat staples and seals with vapor barrier coating.
5. Cover breaks in jacket materials with patches of same material as vapor barrier. Extend patches not less than 3-inches beyond break or penetration on all directions and secure with adhesive and staples. Seal staples and joints with vapor barrier coating.
6. Fill jacket penetrations. i.e., hangers, thermometers and damper operating rods, and other voids in insulation with vapor barrier coating. Seal penetration with vapor barrier coating. Insulate hangers and supports for cold duct in un-conditioned spaces to extent to prevent condensation on surfaces.
7. Seal and flash insulation terminations and pin punctures with reinforced vapor barrier coating.
8. Continue insulation at fire dampers and fire/smoke dampers up to and including those portions of damper frame visible at outside of the rated fire barrier. Insulating terminations at fire dampers in accordance with this Section.
9. Do not conceal duct access doors with insulation. Install insulation terminations at access door in accordance with this Section.

I. Insulation Shields: Provide hangers and shields (18 gauge minimum) outside of insulation for cold piping (<60 degrees F). Hot water piping hangers may penetrate insulation to contact pipe directly. Provide 18-inch long, noncompressible insulation section at insulation shields for lines 2-inches and larger (hot and cold) piping.

J. Ductwork Surfaces to be Insulated: Washington Climate Zone 4

Item to be Insulated	System Insulation Type	Duct Size	Minimum Installed R-Value
Supply ductwork inside building thermal envelope, where duct is not specified to be lined	A	All	R-4
Return ductwork inside building thermal envelope, where duct is not specified to be lined	--	All	None
Outside air ducts inside building thermal envelope and upstream of automatic shutoff damper	A	Airflow less than 2800 cfm	R-8
Built up HVAC equipment plenums and unit housings not preinsulated	B	All	R-6

Item to be Insulated	System Insulation Type	Duct Size	Minimum Installed R-Value
Exhaust ducts within building thermal envelope, between energy recovery media, and automatic shutoff damper	A	All	R-8
Exhaust ducts within building thermal envelope between exterior and automatic shutoff damper	A	All	R-16

1. Note: Insulation R-value shown is a minimum. If state codes require higher R-value, then provide insulation per code requirements.

K. Piping Surfaces to be Insulated:

Item to be Insulated	**System Insulation Type**	**Conductivity Range (Btu-inch per hour per SF per degrees F)**	**Pipe Size (Inches)**	**Insulation Thickness (Inches)**
Heating, Steam, and Steam Condensate (above 350F)	1, 4	0.32-0.34 at a mean rating temperature of 250 degrees F	<1 1 to <1.5 1.5 to <4 4 to <8 >= 8	4.5 5.0 5.0 5.0 5.0
Heating, Steam, and Steam Condensate (251F to 350F)	1, 4	0.29-0.32 at a mean rating temperature of 200 degrees F	<1 1 to <1.5 1.5 to <4 4 to <8 >= 8	3.0 4.0 4.5 4.5 4.5
Heating, Steam, and	1, 4	0.27-0.30 at a mean rating	<1	2.5

Item to be Insulated	System Insulation Type	Conductivity Range (Btu-inch per hour per SF per degrees F)	Pipe Size (Inches)	Insulation Thickness (Inches)
Condensate (201F to 250F)		temperature of 150 degrees F	1 to <1.5 1.5 to <4 4 to <8 >= 8	2.5 2.5 3.0 3.0
Heating, Steam, and Steam Condensate (141F to 200F)	1, 4	0.25-0.29 at a mean rating temperature of 125 degrees F	<1 1 to <1.5 1.5 to <4 4 to <8 >= 8	1.5 1.5 2.0 2.0 2.0
Heating, Steam, and Steam Condensate (105F to 140F)	1, 4	0.22-0.28 at a mean rating temperature of 100 degrees F	<1 1 to <1.5 1.5 to <4 4 to <8 >= 8	1.0 1.0 1.5 1.5 1.5
Chilled Water (40F to 60F)	1, 4	0.21-0.27 at a mean rating temperature of 75 degrees F	<1 1 to <1.5 1.5 to <4 4 to <8 >= 8	0.5 0.5 1.0 1.0 1.0
Chilled Water (<40F)	1, 4	0.20-0.26 at a mean rating temperature	<1 1 to <1.5	0.5 1.0

Item to be Insulated	System Insulation Type	Conductivity Range (Btu-inch per hour per SF per degrees F)	Pipe Size (Inches)	Insulation Thickness (Inches)
		of 50 degrees F	1.5 to <4 4 to <8 >= 8	1.0 1.0 1.5
Refrigerant Suction and Liquid Piping (40F to 60F)	2	0.21-0.27 at a mean rating temperature of 75 degrees F	<1 1 to <1.5 1.5 to <4 4 to <8 >= 8	0.5 0.5 1.0 1.0 1.0
Refrigerant Suction and Liquid Piping (<=40F)	2	0.20-0.26 at a mean rating temperature of 50 degrees F	<1 1 to <1.5 1.5 to <4 4 to <8 >= 8	0.5 1.0 1.0 1.0 1.5
Refrigerant Hot Gas Piping for VRF Systems	2	0.20-0.26 at a mean rating temperature of 50 degrees F	All	0.5
Breeching, Generator Exhaust	3	0.52-0.58 at a mean rating temperature of 500 degrees F	All	4.0
Heating Water Storage and Air Separation	2, 5	0.24-0.28 at a mean rating temperature	N/A	2.0

Item to be Insulated	System Insulation Type	Conductivity Range (Btu-inch per hour per SF per degrees F)	Pipe Size (Inches)	Insulation Thickness (Inches)
Tanks		of 75 degrees F		
Chilled Water Storage and Air Separation Tanks	2, 5	0.24-0.28 at a mean rating temperature of 75 degrees F	N/A	1.0
Heat Exchangers (Steam)	2, 5	0.24-0.28 at a mean rating temperature of 75 degrees F	N/A	4.0
Heat Exchangers (Hydronic)	2, 5	0.24-0.28 at a mean rating temperature of 75 degrees F	N/A	2.0
Condenser Water (Exterior)	1, 2	0.21-0.27 at a mean rating temperature of 75 degrees F	1 to 6 >=8	1.0 1.5
Item to be Insulated	**System Insulation Type**	**Conductivity Range (Btu-inch per hour per SF per degrees F)**	**Pipe Size (Inches)**	**Insulation Thickness (Inches)**
Refrigerant Suction and Liquid Piping (40F to 60F)	2	0.21-0.27 at a mean rating temperature of 75 degrees F	<1 1 to <1.5 1.5 to <4 4 to <8 >= 8	0.5 0.5 1.0 1.0 1.0

Refrigerant Suction and Liquid Piping (<=40F)	2	0.20-0.26 at a mean rating temperature of 75 degrees F	<1 1 to <1.5 1.5 to <4 4 to <8 >= 8	0.5 1.0 1.0 1.0 1.5

1. Note: Insulation thickness shown is a minimum. If state code requires additional thickness, then provide insulation thickness per code requirements.

3.02 TYPE A, FLEXIBLE GLASS WOOL BLANKET

A. Install insulation in conformance with manufacturer's recommendations and requirements.

B. Duct Wrap: Cover air ducts per insulation table except ducts internally lined where internal duct lining is adequate to achieve adequate insulating values to meet local Energy Codes (indicate on shop drawings, locations where duct wrap is planned to be omitted and indicate internal duct lining insulating values to confirm they will meet the Energy Code). Wrap tightly with circumferential joints butted and longitudinal joints overlapped minimum of 2-inches. On ducts over 24-inches wide, additionally secure insulation with suitable mechanical fasteners at 18-inches on center. Circumferential and longitudinal joints stapled with flare staples 6-inches on center and covered with 3-inch wide, foil reinforced tape.

3.03 TYPE B, DUCT LINER

A. Install insulation in conformance with manufacturer's recommendations and requirements.

B. Duct Liners: Mat finish surface on air stream side. Secure insulation to cleaned sheet metal duct with continuous (minimum 90) percent coat of adhesive. Secure liner with mechanical fasteners 15-inches on center or per manufacturer requirements. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation overlap sides. Factory/field coat exposed edges. Metal nosing for exposed leading or transverse edges and when velocity exceeds 3500 FPM or manufacturer rating on exposed edges. Keep duct liner clean and free from dust. At completion of Project, vacuum duct liner if it is dirty or dusty. Do not use small pieces. If insulation is installed without horizontal, longitudinal, and end joints butted together, installation will be rejected and work removed and replaced with work that conforms to this Specification.

3.04 TYPE F, CLOSED-CELL POLYISOCYANURATE RIGID FOAM BOARD

A. Install insulation in conformance with manufacturer's recommendations and requirements.

3.05 TYPE 2, FLEXIBLE ELASTOMERIC PIPE INSULATION

A. Flexible Elastomeric Insulation:

1. Slip insulation on pipe prior to connection. Butt joints sealed with manufacturer's adhesive. Insulate fitting with miter-cut pieces. Cover insulation exposed to weather and below grade with two coats of finish as recommended by manufacturer.

B. Flexible Elastomeric Tubing:

1. Flexible Elastomeric Tubing: Slip insulation over piping or, if piping is already installed, slit insulation and snap over piping. Joints and butt ends must be adhered with 520 adhesive.

C. See General Installation Requirements above.

D. Install insulation in conformance with manufacturer's recommendations and requirements.

E. Slip insulation on pipe prior to connection. Butt joints sealed with manufacturer's adhesive. Insulate fitting with miter-cut pieces. Cover insulation exposed to weather and undergrade with two coats of finish as recommended by manufacturer.

F. Install in accordance with manufacturer's instructions for below grade installation.

3.06 ACCESSORIES

A. Install insulation in conformance with manufacturer's instructions, recommendations and requirements.

B. See General Installation Requirements above.

C. Furnish and install accessories for all insulation types listed in this Section.

3.07 DUCT INSULATION ACCESSORIES

A. Install insulation in conformance with manufacturer's recommendations and requirements.

3.08 DUCT INSULATION COMPOUNDS

A. Install insulation in conformance with manufacturer's recommendations and requirements.

END OF SECTION

SECTION 230933 – ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Room Thermostats
2. Time Switches
3. Relays and Contactors
4. Transformers
5. Wiring
6. Damper Operators

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Power wiring per Division 26, Electrical.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Drawings: complete control diagram, including written description of control sequences.
2. Operation and Maintenance Manual: Include record wiring drawings showing installed condition and operating changes made during start-up.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.06 WARRANTY

A. Warranty of materials and workmanship as outlined in Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Within 30 days prior to warranty expiration date, control supplier to visit job site and check calibration, operation, and adjustment of temperature, pressure and humidity sensors, valves, dampers, thermostats and other devices installed by control supplier. Make repair or replacement of defective control equipment as required at no charge to Owner.
2. Submit letter to Architect certifying that this work has been completed.
3. Attach copy of service report signed by Owner's Authorized Representative.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Room Thermostats:

1. Honeywell
2. Siemens
3. Johnson Controls
4. Reliable Controls
5. Alerton

B. Time Switches:

1. Paragon
2. Tork
3. Intermatic
4. Or approved equivalent.

C. Damper Operators:

1. Belimo
2. Honeywell
3. Siemens
4. Or approved equivalent.

2.02 ROOM THERMOSTATS

A. For packaged equipment, including direct expansion split system units, provide thermostats/controllers as manufactured by packaged equipment manufacturer.

B. Electronic Thermostat:

1. Seven day programmable, PI control.
2. Occupied/unoccupied heat and cool setpoints.
3. Automatic heat/cool changeover and fan control.
4. Touch screen display.
5. Cooling Stages: Provide as required to match in air conditioner.
6. Basis of Design: Honeywell RTH 7600D.

2.03 TIME SWITCHES

A. Programmable electronic 2 channel seven-day, 24-hour-a-day, skip-a-day feature. Battery backup. 120V, 1-phase. Clock subject to being overridden by night low limit stat. Minimum 2-line, 14-character per line display.

2.04 RELAYS AND CONTACTORS

A. Provide relays and contactors where required or as shown on Drawing to meet operating sequence where not internal to manufacturer's equipment.

B. Furnish relays or contactors with required coil voltage and contact amperage rating for use specified on Drawing and in manufacturer's equipment.

C. Mount relays in single control cabinet with hinge door and latch.

D. Control cabinet contains relays and numbered terminal strips for connection of relays and field wiring. Mount cabinet on painted plywood panel securely attached to wall framing. Mount time clock, transformer and motor contactors (if required) on plywood adjacent to control panel.

2.05 TRANSFORMERS

A. Transformers selected and sized for appropriate VAC capacity and installed and fused according to applicable codes. Provide wiring to nearest suitable power source as required.

2.06 WIRING

A. In accordance with Division 26, Electrical and applicable codes.

B. Provide line and low voltage wiring relating to control system. Includes wiring of contactors, relays, circuits, and incidental power wiring: operation power for time clock, power when run through stat/timeclock/relay, transformers.

2.07 DAMPER OPERATORS

A. Size operators to operate dampers properly against system pressures, pressure differentials and velocities. Damper operators sized for 150 percent of damper forces normally encountered. Spring return closed for outside air applications.

PART 3 - EXECUTION

3.01 SEQUENCE OF OPERATION

A. AC Units: Room thermostats to modulate economizer cycle, cooling and heating in sequence to maintain setpoint. Provide motorized low leakage outside air dampers. Dampers to be closed on fan shutdown and during NLL operation. Program thermostats to time schedule coordinated with Owner. See below for fire shut-down.

B. Central timeclock: Program equipment to start/stop at times determined with Owner; set times and demonstrate to Owner during programming. Set timeclock to start/stop the following equipment:

3.02 INSTALLATION OF AUXILIARY CONTROL DEVICES

A. General:

1. Install sensors and thermostats in accordance with manufacturer's recommendations.
2. Room sensors and thermostats installed at 48-inches AFF to midline of sensor on concealed junction boxes properly supported by wall framing at the locations shown on the Drawings.

B. Actuators:

1. General:

a. Mount and link control damper actuators according to manufacturer's instructions.
b. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.

2. Actuator Mounting for Damper and Valve arrangements to comply to the following:

a. Damper Actuators: Do not install in the air stream.
b. Use a weather proof enclosure (clear and see through) if actuators are located outside.
c. Damper or valve actuator ambient temperature not-to-exceed 122 degrees F through any combination of medium temperature or surrounding air. Provide appropriate air gaps, thermal isolation washers or spacers, standoff legs, or insulation as necessary. Mount per manufacturer's recommendations.
d. Actuator cords or conduit to incorporate a drip leg if condensation is possible. Do not allow water to contact actuator or internal parts. Location of conduits in temperatures dropping below dew point to be avoided to prevent water from condensing in conduit and running into actuator.

END OF SECTION

SECTION 232113 – HVAC PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Refrigerant Piping

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Welding Certificates: Copies of certificates for welding procedures and personnel.
2. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:

    a. Test procedures used.
    b. Test results that comply with requirements.
    c. Failed test results and corrective action taken to achieve requirements.

3. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at project site.
4. Grooved couplings, fittings, valves, and specialties: Show grooved joint couplings and fittings on Shop Drawings and product submittals, and specifically identify with the applicable coupling style number.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 23000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Installer Qualifications: Company specializing in performing work of the type specified in this Section, with documented experience.
2. Welder Qualifications: Certify in accordance with ASME (BPV IX).
3. ASME Compliance: Comply with ASME B31.9 "Building Services Piping" for materials, products, and installation. Provide safety valves and pressure vessels with the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 01.
4. Grooved couplings, fittings, valves, and specialties: Provide all grooved couplings, fittings, valves, and specialty products from a single manufacturer. Utilize only grooving tools from the same manufacturer as the grooved components. Date-stamp all castings used for couplings housings, fittings, or valve and specialty bodies for quality assurance and traceability.
5. Refrigerant Piping:

    a. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX "Welding and Brazing Qualifications."
    b. ASHRAE Standard: Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
    c. ASME Standard: Comply with ASME B31.5, "Refrigeration Piping."
    d. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical" or UL 429 "Electrically Operated Valves."

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 REFRIGERANT PIPING

A. Piping:

1. Copper Tube: ASTM B 280, Type ACR, annealed-temper tube, clean, dry and capped.

    a. Fittings: ASME B16.22 wrought copper.
    b. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy (15 percent Silver).

B. Valves:

1. Manufacturers:

    a. Hansen Technologies Corporation
    b. Henry Technologies

c. Danfoss Flomatic
d. Substitutions: See Section 23 00 00, HVAC Basic Requirements, Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.

2. Packaged Ball Valves:

a. Two piece bolted forged brass body with Teflon ball seals and copper tube extensions, brass seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of and maximum temperature of 300 degrees F.

C. Flexible Connectors:

1. Manufacturers:

a. Metraflex, VRF Flex, model VAV-RF8
b. Or approved equivalent.

2. Provide stainless steel refrigerant flexible connector with copper ends, operating at 700 psi, cleaned and bagged per PRAXAIR 99.

PART 3 - EXECUTION

3.01 REFRIGERANT PIPING INSTALLATION

A. Install systems in accordance with ASHRAE Standard 15.

B. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

C. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.

D. Flood piping system with nitrogen when brazing.

E. Follow ASHRAE Standard 15 procedures for charging and purging of systems and for disposal of refrigerant.

F. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.

G. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.

H. Fully charge completed system with refrigerant after testing.

I. Install flexible connectors at connection to equipment with compressors or at fan coil units installed with a vibration isolator.

J. Field Quality Control:

1. Test refrigeration system in accordance with ASME B31.5.
2. Pressure test system with dry nitrogen to 200 PSI. Perform final tests at 27-inches vacuum and 200 PSI using electronic leak detector. Test to no leakage.

END OF SECTION

SECTION 233100 – HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Ductwork, Joints and Fittings
2. Insulated Flexible Duct
3. Drain Pans
4. Ductwork Joint Sealers and Sealants

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Section 23 05 29, Hangers and Supports for HVAC Piping, Ductwork and Equipment.
2. Section 23 05 93, Testing, Adjusting, and Balancing for HVAC.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Welding Certificates
2. Field Quality Control Reports

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. NFPA Compliance:

a. NFPA 90A Installation of Air Conditioning and Ventilating Systems.
b. NFPA 90B, Installation of Warm Air Heating and Air Conditioning Systems.

2. Comply with SMACNA's HVAC Duct Construction Standards – Metal and Flexible for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Provide sheet metal materials free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.07 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select size and type of air-moving and distribution equipment and other air system components. Duct design is generally diagrammatic and is not meant to be scaled. Major changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

PART 2 - PRODUCTS

2.01 DUCTWORK, JOINTS, AND FITTINGS

A. Manufacturers:

1. Ductmate
2. Lindab Inc.
3. Nexus Inc.
4. SEMCO
5. United McGill Corporation
6. Ward Industries

B. Materials:

1. Galvanized Steel Ducts: Hot-dipped galvanized steel sheet, lock-forming quality, ASTM A 653/A 653M FS Type B, with G90/Z275 coating, minimum 26 gauge except where heavier material is specified. Ducts to have mill phosphatized finish for surfaces exposed to view.

C. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's HVAC Duct Construction Standards – Metal and Flexible and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
2. Deflection: Duct systems not-to-exceed deflection limits according to SMACNA's HVAC Duct Construction Standards – Metal and Flexible.
3. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.

D. Formed-On Flanges: construct according to SMACNA's HVAC Duct Construction Standards – Metal and Flexible, Figure 1-4, using corner, bolt, cleat, and gasket details.

1. Duct Size: Maximum 30-inches wide and up to 2-inch wg pressure class.
2. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.
3. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19-inches and larger and 0.0359-inch thick or less, with more than 10 SF of nonbraced panel area unless ducts are lined.

E. Round, Spiral Lock-Seam Ducts: Fabricate supply ducts of material specified in this Section according to SMACNA's HVAC Duct Construction Standards – Metal and Flexible.

1. Ducts up to 20-inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
2. Ducts 21- to 72-inches in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
3. Ducts Larger than 72-inches in Diameter: Companion angle flanged joints per SMACNA HVAC Duct Construction Standards-Metal and Flexible, Figure 3-2.
4. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.

F. 90-Degree Tees and laterals and Conical Tees: Fabricate to comply with SMACNA's HVAC Duct Construction Standards-Metal and Flexible, with metal thicknesses specified for longitudinal-seam straight ducts.

G. Diverging-Flow Fittings: Fabricate with reduced entrance to branch taps and with no excess material projecting from fitting onto branch tap entrance.

H. Fabricate elbows using die-formed, gored, pleated, or mitered construction. Bend radius of die-formed, gored, and pleated elbows to be 1.5 times duct diameter. Unless elbow construction type is indicated, fabricate elbows as follows:

1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's HVAC Duct Construction Standards-Metal and flexible, unless otherwise indicated.
2. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from minus 2- to plus 2-inch wg (minus 500 to plus 500 Pa):

    a. Ducts 3- to 36-inches in Diameter: 0.034-inch .
    b. Ducts 37- to 50-inches in Diameter: 0.040-inch.

3. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2- to 10-inch wg:

    a. Ducts 3- to 26-inches in Diameter: 0.034-inch.
    b. Ducts 27- to 50-inches in Diameter: 0.040-inch.

4. 90-Degree, Two-Piece, Mitered Elbows: Use only for supply systems or for material-handling Class A or B exhaust systems and only where space restrictions do not permit using radius elbows. Fabricate with single-thickness turning vanes.
5. Round Elbows:

    a. 8-inches and Less in Diameter: Fabricate die-formed elbows for 45 and 90-degree elbows and pleated elbows for 30, 45, 60 and 90 degrees only. Fabricate nonstandard bend-angle configurations or non-standard diameter elbows with gored construction.
    b. 9 through 14-inches in Diameter: Fabricate gored or pleated elbows for 30, 45, 60 and 90 degrees unless space restrictions require mitered elbows. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
    c. Larger than 14-inches in Diameter and All Flat-Oval Elbows: Fabricate gored elbows unless space restrictions require mitered elbows.

6. Die-Formed Elbows for Sizes through 8-inches in Diameter and Pressures 0.040-inch thick with two-piece welded construction.
7. Round Gored-Elbow Metal Thickness: Same as non-elbow fittings specified above.
8. Pleated Elbows for Sizes through 14-inches in Diameter and Pressures through 10-inch wg (2500 Pa): 0.022-inch.
9. Not acceptable:

    a. Corrugated or flexible metal duct.
    b. Adjustable elbows.

2.02 INSULATED FLEXIBLE DUCT

A. Manufacturers:

1. ATCO
2. Flexmaster
3. J.P. Lamborn Co.
4. Hart and Cooley

B. Construction: Standard factory fabricated product. Inner wall: Impervious vinyl or chlorinated polyethylene, permanently bonded to a vinyl or zinc-coated spring steel helix.

C. Insulation: Fiberglass blanket insulation covered by an outer wall of vinyl or fiberglass-reinforced metalized vapor barrier.

D. Listing: UL 181 listed Class 1 flexible air duct material. Overall thermal transmission: No more than 0.25 BTU/in or hr/sq. degrees F at 75 degrees F differential, per ASTM C335.

E. Vapor transmission value no more than 0.10 perm, per ASTM E96.

F. Pressure Rating: 4-inch wg positive pressure and 1-inch wg negative pressure.

G. Performance Air Friction Correction Factor: 1.3 maximum at 95 percent extension. Working air velocity: Minimum 2000 FPM.

H. Flame Spread Rating: No more than 25.

I. Smoke Development Rating: No more than 50 as tested per ASTM E84.

J. Insertion Loss: Minimum attenuation of 29 DB for 10-foot straight length at 8-inch diameter at 500 Hz.

2.03 DRAIN PANS

A. Primary Drain Pans: Stainless Steel, fabricated in accordance with ASTM A167 and A480.

B. Secondary Drain Pans: Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A 653/A 653M FS Type B, with G90/Z275 coating.

2.04 DUCTWORK JOINT SEALERS AND SEALANTS

A. Manufacturers:

1. Ductmate
2. Duro Dyne
3. Hardcast
4. United McGill Corporation
5. Vulkem
6. Foster
7. Childer

B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

C. Low Emitting Materials Requirement: Adhesives, sealants and sealant primers must comply with South Coast Air Quality Management District (SCAQMD) Rule #1168.

D. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure and leakage class of ducts.

E. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E 84.

F. Water Based Sealant for Brush-On Application: Flexible, adhesive sealant, resistant to UV light, UL-181A, and UL-181-B listed, complying with NFPA requirements for Class 1 ducts. Min. 69 percent solids, nonflammable. Hardcast Versa-Grip 181; Childers CP-146; Foster 32-19

for SMACNA 1/2, 1, 2, 3, 4, 6, and 10-inch WG duct classes, and SMACNA Seal Class A, B, or C.

G. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use O.

H. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

I. Polyurethane Sealant: General-purpose, exterior use, non-brittle sealant for gunned application. Vulkem 616 or equal.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. General: Use the following pressure seal, and leakage class(es) in design of ductwork specified in this section unless otherwise noted on Drawings.

SYSTEM	PRESSURE CLASS (Inches of Water)	SEAL CLASS	LEAKAGE CLASS ROUND DUCTS	LEAKAGE CLASS RECTANGULAR DUCTS
Low pressure	+ 1-inch	A	3	6
Return and exhaust	0.5-inch more negative than return/exhaust fan pressure or -2-inch pressure class, whichever is more negative.	A	3	6

B. Ductwork Installation:

1. General: Install entire duct system in accordance with drawings, Specifications, and latest issues of local Mechanical Code, NFPA 90A, and SMACNA Duct Construction Manual. At Contractor's option, rectangular ductwork may be resized to maintain an equivalent air velocity and friction rate, while maintaining a maximum aspect ratio of 3. Remove markings and tagging from ductwork exterior surface in mechanical rooms and other locations where ductwork is exposed.
2. The duct layout shown on the Contract Drawings is diagrammatic in nature. Coordinate the ductwork routing and layout, and make alterations to the ductwork routing and layout to eliminate physical interferences. Where deviations in the ductwork routing as shown in the Contract Drawings are required, alterations may be made so as not to compromise the air flow, pressure drop, and sound characteristics of the duct fitting or duct run as shown on the Contract Drawings. In the event Architect determines that the installed ductwork is inconsistent with the above mentioned criteria, remove and replace at no additional cost to the Owner.
3. Install ducts with fewest possible joints.
4. Install fabricated fittings for changes in directions, size, shape, and for connections.

5. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12-inches, with a minimum of 3 screws in each coupling.
6. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
7. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
8. Install ducts with a clearance of 1-inch, plus allowance for insulation thickness. Allow for easy removal of ceiling tile.
9. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.
10. Coordinate layout with suspended ceiling, air duct accessories, lighting layouts, and similar finish work.
11. Electrical and IT Equipment Spaces: route ducts to avoid passing through transformer vaults, electrical equipment spaces, IDF/MPOE rooms, and enclosures.
12. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2-inches.
13. Install ducts with hangers and braces designed to withstand, without damage to equipment, seismic force required by applicable building codes. Reference SMACNA's Seismic Restraint Manual: Guidelines for Mechanical Systems, Mason Seismic Restraint and Support Systems.
14. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's Duct Cleanliness for New Construction Advanced Level.
15. Paint interiors of metal ducts, that do not have duct liner, for 24-inches upstream of registers and grilles. Apply one coat of flat, black, latex finish coat over a compatible duct material.
16. Install ductwork in the location and manner shown and detailed. Review deviations required by job conditions with Architect prior to any fabrication. Provide fittings for construction per SMACNA.
17. Install flexible ductwork to limit sag between support hangers to 1/2-inch per foot of spacing support.

C. Flanged Take-Offs:

1. Install at branch takeoffs to outlets using round or flex duct.
2. Flanged take-offs secured with minimum 8-inch screw spacing (three screws minimum).
3. Provide ductwork taps and branches off of main ducts at 45 degrees whether shown on Drawings or not (drawings are diagrammatic).

D. Cleaning:

1. Clean duct systems with high power vacuum machines. Protect equipment that could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.
2. Grille and Exposed Duct Cleaning:

    a. After completion of ductwork installation, operate each fan system (excluding exhaust fans) for a minimum of 30 minutes prior to installation of ceiling grilles

and diffusers. After grilles and diffusers are installed, clean out accumulation of particles from grilles and diffusers prior to acceptance.

b. Clean exterior surface of ducts exposed to public view of chalk, pencil and pen marks, labels, sizing tags, dirt, dust, etc., so that upon completion of installation, ducts are left in clean and unblemished manufactured conditions.

c. Exposed duct and grilles to remain free of dust entrained streaks due to leakage at joints and grille connections during warranty period. Clean leaks, seal and refinish to match existing if visible streaks develop.

3.02 DUCTWORK, JOINTS AND FITTINGS INSTALLATION

A. Duct Materials – Applied Locations:

1. General: Use the following materials in design of ductwork specified in this Section unless otherwise noted on the Drawings.

Location or Application	**Material**
Supply, Return, Transfer, and Exhaust – Low Pressure (downstream of terminal units)	Single Wall, Galvanized Steel
General Exhaust Branch Serving Air Inlet in Shower Room or Toilet Room with Shower	Single Wall, Aluminum or Type 304 Stainless Steel

B. Ductwork Installation:

1. Fabricate radius elbows with centerline radius not less than 1-1/2 duct diameters.
2. Do not install duct size transition pitch angles which exceed 30 degrees for reductions in duct size in the direction of airflow, and 15 degrees for expansions in duct size in the direction of airflow.
3. Install fixed turning vanes in square throat rectangular elbows and in tees.
4. Fabricate duct turns with the inside (smallest) radius at least equal to the duct width (supply ducts) and 1.5 times radius (return and exhaust ducts). Where necessary, square elbows may be used, with maximum available inside radius and with fixed turning vanes. In healthcare settings such as hospitals and medical office buildings, square elbows and turning vanes allowed on supply ductwork only.

3.03 INSULATED FLEXIBLE DUCT INSTALLATION

A. Provide sheet metal plenum or rigid elbow and connect to diffusers and grilles with ductwork connections. Refer to Drawings for more information. Provide straight section of flexible duct with minimum length of 2-feet and maximum length of 5-feet and connect to sheet metal plenums and rigid elbows connected to diffusers and grilles, unless noted otherwise.

1. Provide round neck grilles/diffusers or square-to-round transitions. Flexible duct connections directly to diffuser and grilles is not allowed.
2. Flexible duct allowed in concealed spaces above lay-in ceilings only.

3.04 DRAIN PANS INSTALLATION

A. Install where shown on Drawings. Drain provided by Division 22, Plumbing. Provide drain (sized per code) connection from each drain pan and pipe to nearest floor drain through trap and 10-inch air gap. Drain pans over 6-feet in length require drain connections from both ends. Pitch drain pans in direction of air flow and to drain. Support secondary drain pan independently from equipment.

3.05 DUCTWORK JOINT SEALERS AND SEALANTS INSTALLATION

A. Joints and Seam Joint Sealing:

1. Seal duct seams and joints according to SMACNA's HVAC Duct Construction Standards – Metal and Flexible, for duct pressure class indicated.
2. Seal transverse joints, longitudinal seams and duct wall penetrations including screw, fastener, pipe, rod, and wire.
3. Seal ducts before external insulation is applied.
4. Fasteners such as sheet-metal screws, machine screws or rivets to be cadmium plated.
5. Rectangular Ductwork: Where intermediate joint reinforcement is required for duct of negative pressure class, pre-drill stiffening flange and provide fastener maximum 8-inches on center. Where retaining flanges are welded to duct wall, paint welds with zinc coating.
6. Single Wall Round Ductwork: Joint to incorporate beaded slip collar with minimum #8 sheet metal screws 8-inches on center. Seal ductwork as specified in this Section.
7. Seal joints and seams. Apply sealant to make end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
8. Double Wall Round Ductwork: Joint to incorporate beaded slip collar or flanged connection, with minimum #8 sheet metal screws 8-inches on center. Seal ductwork as specified in this Section.
9. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
10. Provide openings in ductwork where required to accommodate thermometers and control devices. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
11. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities as well as Code required clearances.

END OF SECTION

SECTION 233300 – AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Sheet Metal Materials
2. Backdraft Dampers
3. Dampers
4. Concealed Damper Hardware
5. Access Doors
6. Turning Vanes
7. Flexible Connectors

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Manufacturer's catalog data and fabrication/installation drawings for each factory fabricated duct accessory. Include leakage, pressure drop and maximum back pressure data.
2. Shop Drawings: Indicate air duct accessories.
3. Manufacturer's installation instructions: Provide instructions for each factory fabricated duct accessory.
4. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

    a. See Division 01, General Requirements, Product Requirements for additional provisions.
    b. Extra Fusible Links: One of each type and size.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this Section, with minimum five years of documented experience.
2. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
3. AMCA 500 – Test Methods for Louvers, Dampers and Shutters.
4. AMCA 511 – Certified Ratings Program for Air Control Devices.
5. AMCA 611, latest edition – Certified Ratings Program – Product Rating Manual for Airflow Measurement Stations.
6. AMCA 610, latest edition – Laboratory Methods of Testing Airflow Measurement Stations for Performance Rating.
7. NFPA 90A – Installation of Air Conditioning and Ventilating Systems.
8. NFPA 92A – Smoke-Control Systems.
9. NFPA 92B – Smoke Control Systems in Atria, Covered Malls and Large Areas.
10. NFPA 101 – Life Safety Code.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 SHEET METAL MATERIALS

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M. Galvanizing: 1-1/4 ounces per square foot total both sides; ducts to have mill-phosphatized finish for surfaces exposed to view.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36-inches or less; 3/8-inch minimum diameter for lengths longer than 36-inches.

2.02 BACKDRAFT DAMPERS

A. Manufacturers:

1. Air Balance
2. Cesco
3. Greenheck
4. Nailor
5. Ruskin

B. Basis-of-Design: Ruskin CB D6.

C. Description: Multiple-blade gravity balanced with center pivoted blades with sealed edges, assembled in rattle free manner with 90-degree stop, adjustment device to permit setting for varying differential static pressure.

D. Frame: 0.125-inch thick 6063-T5 extruded aluminum channel with galvanized steel braces at mitered corners. Provide mounting flange.

E. Blades: Single piece, overlap frame, parallel action, horizontal orientation, minimum 0.07-inch 6063-T5 extruded aluminum material, maximum 6-inch width.

F. Bearings: Corrosion-resistant synthetic, formed as single piece with axles.

G. Blade Seals: Extruded vinyl, mechanically attached to blade edge.

H. Blade Axles: Corrosion-resistant, synthetic formed as single piece with bearings, locked to blade.

I. Tie Bars and Brackets: Galvanized steel.

J. Return Spring: Adjustable tension.

K. Damper Capacity:

1. Closed Position: Maximum back pressure of 16-inches water gauge.
2. Open Position: Maximum air velocity of 2,500-feet per minute.

L. Counterbalances: Adjustable zinc plated steel weights mechanically attached to blade. Must be capable of operating over wide range of pressures.

M. Finish: Mill aluminum.

N. Temperature Rating: -40 degrees F to 200 degrees F.

O. Operation of Blade:

1. Start to Open: 0.01-inch wg
2. Fully Open: 0.05-inch.

P. Pressure Drop: Maximum 0.15-inch wg at 1,500-feet per minute through 24-inch by 24-inch damper.

Q. Factory Sleeve: Minimum 20 gauge thickness, 12-inches in length.

R. Screen: At outdoor intake or discharge. 1/4-inch aluminum.

2.03 DAMPERS

A. Manufacturers:

1. Air Balance
2. Cesco
3. Greenheck
4. Nailor
5. Ruskin

B. Basis-of-Design:

1. Rectangular ductwork for velocities and pressures up to 1,500 fpm and 2.5-inch wg, respectively: Ruskin MD-35.
2. Rectangular ductwork for velocities and pressures up to 3,000 fpm and 4-inch wg, respectively: Ruskin CD-60.
3. Round ductwork for velocities and pressures up to 3,000 fpm and 4-inch wg, respectively: Ruskin CDSR-15.

C. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

1. Pressure Classes of 3-Inch wg (750 Pa) or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.

D. Rectangular Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design with linkage concealed in frame and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum 16 gauge thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.

    a. Roll-Formed Steel Blades: Galvanized sheet steel, 16 gauge thick for velocities up to 1,500 fpm, and 14 gauge thick for velocities up to 3,000 fpm.
    b. Blade Axles: Minimum 1/2-inch diameter, plated steel, hex shaped, mechanically attached to blade.
    c. Bearings: Molded synthetic sleeve, turning in extruded hole in frame.
    d. Tie Bars and Brackets: Galvanized steel.
    e. Mill galvanized.

E. Round Volume Dampers: Single-blade suitable for horizontal or vertical applications.

1. Steel Frames: Galvanized, roll formed, minimum of 20 gauge thick with beads at each end.
2. Blades: Minimum 14 gauge thick, galvanized sheet steel, round, single-piece.
3. Blade Axles: Minimum 1/2-inch square, plated steel, mechanically attached to blade.
4. Bearings: Molded synthetic sleeve, turning in hole in frame.
5. Finish: Mill galvanized.
6. Capacity:

    a. Closed Position: Maximum pressure of 4-inches wg.
    b. Open Position: Maximum air velocity of 3,000-feet per minute.

7. Leakage: Maximum 20 cfm at 4-inches wg.
8. Pressure Drop: Maximum 0.02-inch wg at 1,500-feet per minute through 20-inch diameter dampers.

F. Jackshaft: 1-inch diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.

1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
2. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include 2-inch elevated platform for insulated duct mounting.

2.04 CONCEALED DAMPER HARDWARE

A. Manufacturers:

1. Young Regulator Company

B. Concealed Damper Hardware: For dampers above non-removable ceilings (gyp, plaster, decorative, etc.) where access panels have not been shown on Architectural drawings or in locations where dampers are more than 2-feet above the ceiling, provide:

1. Concealed Damper Regulator: Young Regulator Company Model 315 or approved equivalent.
2. Cable System: Young Regulator Company or approved equivalent.
3. Controller: Young Regulator Company 270-275 or approved equivalent.
4. Control wrenches, wire stops, casing nuts, and stainless steel wire.
5. Paint cover plate to match ceiling color or as directed by Architect.

2.05 ACCESS DOORS

A. Manufacturers:

1. Ductmate
2. Cesco
3. Ruskin
4. Nailor

5. Outdoor Installation: Karp MX insulated exterior access door.

B. Duct Pressure Class 2-inch WC and Greater: Sandwich-type design with threaded locking bolt assembly. Closed cell neoprene gasket permanently bonded to inside panel. Zinc-coated steel wing nuts or polypropylene molded knobs with threaded metal inserts – zinc coated bolts sealed to inner panel.

C. Duct Pressure Class 1-1/2-inch WC and Less: Galvanized steel assembly incorporating frame, door, hinges, and latch(es). Frame tabbed for attachment to duct panel. Double wall door panel with 1-inch insulation. Open cell neoprene gasket attached to frame. Cam latches for tight closure.

D. Plenum Doors: Extruded aluminum frames with extruded santoprene seals. Double-wall 20 gauge galvanized steel door panel with fiberglass insulation.

E. Size: Maximum size available to fit rectangular duct panel dimension or round duct diameter. Plenum doors minimum 2-feet wide by 4-feet high.

F. For outdoor installation, only provide waterproof access doors installed vertically.

2.06 TURNING VANES

A. Manufacturers:

1. Aerodyne
2. Ductmate Industries
3. Duro Dyno Corp.
4. Metalaire Inc.

B. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners to automatically align vanes.

C. Manufactured Turning Vanes: For medium pressure ductwork, ductwork upstream of terminal units, and in ductwork with equal inlet width and height dimensions and outlet width and height dimension, provide double thickness airfoil turning vanes. Low pressure ductwork and ductwork downstream of terminal units use either single thickness or double thickness turning vanes. For mitered rectangular elbows with changes in size from inlet to outlet, only use single thickness turning vanes. Use 2-inch radius vanes spaced on centers of 1.5-inches for single thickness. Use 2-inch radius vanes spaced on centers of 2.125-inches for double thickness.

D. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

2.07 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Duro Dyne Corp.
2. Ventfabrics Inc.

3. Ductmate Industries
4. Hardcast

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Metal-Edged Connectors: Factory fabricated with a fabric strip 4-inches wide attached to two strips of 2-3/4-inch wide, 0.028-inch thick, galvanized sheet steel or 0.032-inch thick aluminum sheets. Select metal compatible with ducts.

D. Provide a spring and bracket assembly to reinforce the fabric with sufficient tension to prevent connector collapse under negative or positive pressure. Number and positioning of spring-link fixture to be determined by the manufacturer to maintain straight axis and without kinks between two sections of duct, or between duct and the moving element. Hardcast Spring-Link SL-200, or equal.

E. Indoor System, Flexible Connector Fabric (FC-I): Glass fabric double coated with neoprene.

1. Minimum Weight: 30 ounces per square yard.
2. Tensile Strength: 395 pounds of force per inch in the warp and 255 pounds of force per inch in the filling.
3. Service Temperature: -40 degrees F to 200 degrees F.

PART 3 - EXECUTION

3.01 DUCT ACCESSORIES GENERAL INSTALLATION

A. Inspect areas to receive air duct accessories. Notify Engineer of conditions that would adversely affect the installation of the dampers. Do not proceed until conditions are corrected.

B. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts.

C. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

D. Do not compress or stretch damper frames into duct or opening.

E. Handle dampers using sleeve or frame. Do not lift dampers using blades, actuators, or jack shafts.

F. Adjust duct accessories for proper settings.

3.02 SHEET METAL MATERIALS INSTALLATION

A. Install bracing for multiple sections to support assembly weights and hold against system pressure. Install bracing as needed.

3.03 BACKDRAFT DAMPERS INSTALLATION

A. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated. Provide at outside air intakes where motorized dampers are not shown on drawings.

3.04 DAMPERS INSTALLATION

A. Where installing volume dampers in ducts with liner, avoid damage to and erosion of duct liner.

B. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts for air balancing. Install at a minimum of two duct widths from each branch takeoff. Provide balancing dampers for all air inlets and outlets.

C. Install dampers square and free from racking with blade running horizontally.

3.05 CONCEALED DAMPER HARDWARE INSTALLATION

A. Coordinate location in Reflected Ceiling Plan and color of concealed damper hardware with Architect prior to installation.

3.06 ACCESS DOORS INSTALLATION

A. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:

1. On both sides of duct coils.
2. Downstream from volume dampers, turning vanes and equipment.
3. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.
4. To interior of ducts for cleaning; before and after each change in direction, at maximum 50-foot (15-m) spacing.
5. Install the following sizes for duct-mounting, rectangular access doors:

    a. One-Hand or Inspection Access: 8-inches by 5-inches.
    b. Two-Hand Access: 12-inches by 6-inches.
    c. Head and Hand Access: 18-inches by 10-inches.
    d. Head and Shoulders Access: 21-inches by 14-inches.
    e. Body Access: 25-inches by 14-inches.
    f. Body Plus Ladder Access: 25-inches by 17-inches.

6. Install the following sizes for duct-mounting, round access doors:

    a. One-Hand or Inspection Access: 8-inches in diameter.
    b. Two-Hand Access: 10-inches in diameter.
    c. Head and Hand Access: 12-inches in diameter.
    d. Head and Shoulders Access: 18-inches in diameter.
    e. Body Access: 24-inches in diameter.

7. Label access doors.

3.07 TURNING VANES INSTALLATION

A. Vanes must be installed, eliminating every other vane is not allowed.

B. Single thickness vanes cannot be over 36-inches long without intermediate vane runner.

C. Install per SMACNA and fasten/support to prevent vibration, noise, and to maintain proper alignment at design velocity.

3.08 FLEXIBLE CONNECTORS INSTALLATION

A. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators. Provide sheet metal weather cover over flexible connections located outdoors. Attach sheet metal to either equipment side or ductwork side, but not both.

B. Per NFPA, do not use flexible connectors on grease exhaust fans.

C. Securely attach spring-lock brackets to the metal strips of the connector collar using No. 8 sheet metal screws.

D. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

E. Adjust the following types in the following locations:

1. FC-I: Indoors.

END OF SECTION

SECTION 233400 – HVAC FANS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Ceiling Exhaust Fans
2. In-Line Centrifugal Fans

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material gauges and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. For belt-driven fans, indicate the number of belts provided for design duty.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Motors: Premium efficiency for Electrically Commutated Motors (ECM) where scheduled on Drawings.
2. Sound power levels as scheduled on Drawings. If not scheduled, within 5 percent of Basis of Design at design flow.

3. Project Altitude: Base air ratings on sea-level conditions for project sites below 2,000 feet in elevation. Base air ratings on actual site elevations for project sites above 2,000 feet in elevation.
4. Operating Limits: Classify according to AMCA 99.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
6. AMCA Compliance: Products are to comply with performance requirements and are to be licensed to use the AMCA-Certified Ratings Seal.
7. NEMA Compliance: Motors and electrical accessories are to comply with NEMA standards.
8. UL Standard: HVAC Fans are to comply with UL 705. Fans used in grease exhaust applications are to be UL 762 listed for grease exhaust. Fans used for smoke control applications are to be UL listed for Power Ventilators for Smoke Control.
9. Belt-driven fans used for smoke control applications are to have 1.5 times the number of belts required for the design duty, with the minimum number of belts being two.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.

B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

1.08 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.09 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Belts: One set for each belt-driven unit.

PART 2 - PRODUCTS

2.01 CEILING EXHAUST FANS

A. Manufacturers:

1. Greenheck
2. Cook
3. Broan
4. Twin City
5. Panasonic

B. Description: Centrifugal fan, direct drive, cabinet and exhaust grille. AMCA rated. Sound level as scheduled. Fan shrouds, motor, and fan wheel are to be removable for service.

C. Wheel: Double width, double inlet, forward curved blades:

D. Housing: Acoustically insulated steel casing, factory standard finish, bottom access through grille, ducted outlet, egg crate inlet grille. Provide stainless steel grille where scheduled.

E. Drives: Direct drive.

F. Back draft damper.

G. Accessories:

1. Hooded wall cap.
2. Louvered wall discharge with bird screen.

H. Motor: Integrally mounted with pre-lubricated sealed ball bearings. Engineered and rated to run continuously.

1. Disconnect Switch: Where not shown on Division 26 and Electrical Drawings, provide nonfusible type, with thermal-overload protection mounted inside fan housing factory wired through an internal aluminum conduit.
2. Motion Sensor: Motion detector with adjustable shutoff timer.
3. Electrically Commutated Motor (ECM) where indicated on Fan Schedule on Drawings.

I. Filter: Washable aluminum to fit between fan and grille.

J. Isolation: Rubber-in-shear vibration isolators.

2.02 IN-LINE CENTRIFUGAL FANS

A. Manufacturers:

1. Greenheck
2. Cook
3. Twin City

B. Description: In-line centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.

C. Wheel: Cast aluminum backward inclined with inlet cone statically and dynamically balanced within its own bearings.

D. Housing:

1. Heavy gauge steel or aluminum housing, suitable for Fan Class, factory standard finish.
2. Removable panels for access to all interior components.
3. Horizontal or vertical configuration, as indicated.
4. Inlet and discharge duct collars.
5. 1-inch thick, 1.5 pounds per cubic foot density fiberglass liner.
6. Aluminum straightening vanes.
7. Support bracket adaptable to floor, sidewall, or ceiling mounting.

E. Bearings and Drives:

1. Bearings: Heavy duty pillow block type, self greasing ball bearings with ABMA 9 life at 50,000 hours.
2. Shafts: Hot rolled steel, ground and polished, with keyway, protectively coated with lubricating oil.
3. Drive: Direct drive matched to fan loads with speed controller. Motor encased in housing outside of airstream, factory wired to disconnect switch located on outside of fan housing.

    a. Electrically Commutated Motor (ECM) where indicated on Fan Schedule on Drawings.

F. Accessories:

1. Belt guard.
2. Variable-Speed Controller: Provide solid-state control to reduce speed from 100 percent to less than 50 percent for motors 1/2 HP or smaller.
3. Discharge Dampers: Parallel blade for mixing or open/close applications and opposed blade for modulating . Heavy duty steel or aluminum, where scheduled. Damper assembly with blades constructed of two plates formed around and welded to shaft, channel frame, sealed ball bearings, with blades linked out of air stream to single control lever. Motorized where indicated and gravity actuated with counterweight, where motorized is not indicated.
4. Louvered wall discharge with bird screen.

G. Inlet/Outlet Screens: Galvanized steel welded grid, removable.

H. Vibration Isolation: Wheel and motor mounted on integral double deflection neoprene isolators.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Install in accordance with manufacturer's instructions.

B. Install power ventilators level and plumb.

C. Fans used for exhaust of moist air are to be constructed of aluminum construction and be warranted for their application in moist conditions.

D. Support suspended units from structure threaded steel rods and vibration isolation device scheduled on Drawings.

E. In seismic zones, restrain support units.

F. Install units with clearances for service and maintenance.

G. Provide fixed sheaves required for final air balance.

H. Provide safety screen where inlet or outlet is exposed.

I. Provide backdraft dampers on discharge of exhaust fans and as indicated on Drawings.

J. Duct installation and connection requirements are specified in other Division 23, HVAC Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors per Section 23 33 00, Air Duct Accessories.

K. Install ducts adjacent to power ventilators to allow service and maintenance.

L. Ground equipment.

M. Tighten electrical connectors 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.

N. Equipment Startup Checks:

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. Verify lubrication from bearings and other moving parts.
6. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
7. Disable automatic temperature-control operators.

O. Starting Procedures:

1. Energize motor and adjust fan to indicated rpm.
2. Measure and record voltage and amperage.

P. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

Q. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

R. Shut unit down and reconnect automatic temperature-control operators.

S. Replace fan and motor pulleys as required to achieve design airflow.

T. Provide totally enclosed fan cooled motors when motor is located outdoors, whether under a cover or not, or exposed to moisture. Provide protective covering for electronically commutated motors located in outdoor or wet/wash-down locations.

U. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

V. Adjust damper linkages for proper damper operation.

W. Adjust belt tension.

X. Lubricate bearings.

Y. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris. Vacuum fan wheel and cabinet.

Z. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

AA. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC fans. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.

3.02 CEILING EXHAUST FANS

A. Suspend units from structure; use steel wire or metal straps.

END OF SECTION

SECTION 233700 – AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Grilles, Registers, Diffusers
2. Louvers

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
3. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size and accessories furnished.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Air Distribution Diffuser, Register, and Grille Schedule lists Basis of Design, with any specialty accessories, construction, finish or other criteria noted on schedule. Submitted air distribution must match criteria of Basis of Design:

a. Construction materials and appearance.
b. Frame/installation method.
c. Isothermal throw plus or minus 5 percent at design flows shown on drawings.
d. Noise Criteria: NC value plus or minus 1 at design flows shown on drawings.
e. Accessories: Equal to Basis of Design.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 23 00 00, HVAC Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 23, HVAC sections, where more than a single type is specified for the application, provide single selection for each product category.

B. Grilles, Registers, Diffusers:

1. Anemostat
2. Carnes
3. Environmental Air Products
4. Krueger
5. Metalaire
6. Nailor
7. Price Co.
8. Shoemaker
9. Titus
10. Tuttle & Bailey
11. Seiho
12. Or approved equivalent.

C. Louvers:

1. Ruskin Manufacturing
2. Pottorff
3. Carnes
4. Cesco
5. Greenheck
6. Or approved equivalent.

2.02 GRILLES, REGISTERS, DIFFUSERS

A. Diffuser, Register and Grille Schedule lists Basis of Design, with specialty accessories, construction, finish or other criteria noted on schedule. Submitted air distribution must match criteria of Basis of Design, including accessories and finish:

1. Matching construction materials and appearance. Equal installation method/frame.
2. Pressure drop equal to or less than Basis of Design at CFM on Drawings.
3. Throw: Isothermal jet throw plus or minus 5 percent of Basis of Design at CFM listed on Drawings.
4. Noise Criteria: Plus or minus 1 NC of Basis of Design at CFM listed on Drawings. If Basis of Design NC is below registered level, submitted must match. NC rating with 10 dB room factor or less.

B. Provide 1-, 2-, 3-, or 4-way deflection as indicated on Drawings.

C. Provide pattern controllers for linear supply air diffusers.

D. Register Dampers: Dampers utilized with grilles. Opposed blade dampers utilizing a side operated worm drive which provides external duct operation. Slot the end of the shaft to receive a screwdriver. Factory assembled side operator. Construct of the same material as the grille. Manufacturer same as grilles/diffuser.

E. Coordinate mounting frames with ceiling construction type. Verify per reflected ceiling plans.

2.03 LOUVERS

A. General: Frame and sill styles compatible with adjacent substrate, specifically manufactured to fit into construction openings with accurate fit and adequate support for weatherproof installation. Reference Drawings and Specifications for types of substrate which will contain each type of louver. Construct of aluminum extrusions, ASTM B221, Alloy 6063-T5. Weld units or use stainless steel fasteners. On inside face of exterior louvers, provide anodized aluminum wire bird screen mounted in removable extruded aluminum frames. AMCA licensed performance ratings.

B. Blades set 3 to 5-inches on center, 37.5 degree angle with rain hook on blade, minimum blade thickness 0.080-inch, drainable blade style. Minimum 57 percent free area for 48-by 48-inch unit. Maximum water penetration 0.01 ounce water psf free area at 1000 FPM. Maximum intake pressure drop of 0.10-inch wg at 750 FPM free velocity. Provide downspouts in jambs, designed to drain water from louver for minimum water cascade from blade to blade. Provide drain gutter in head frame and each blade.

C. Reference Drawings for free area required.

D. Provide access door in duct to clean birdscreen.

E. Finish: Factory Kynar 500 fluoropolymer spray finish; color to be selected by Architect. Conform to AAMA 605.2. Apply coating following cleaning, and pretreatment. Dry louvers before final finish application. 1.2 mils total dry film thickness when baked at 450 degrees F for ten minutes.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

A. Install in accordance with manufacturer's instructions. Provide seismic supports, clips, and bracing per local code. Coordinate installation of framing. Provide complete coverage of rough openings by integral device flanges or auxiliary frames. Where above ceiling location is unconditioned space, caulk rough openings; repair and re-paint locations where dust entrainment streaks develop due to unsealed openings.

B. Damp locations, such as lockers, restrooms, showers, natatoriums, whirlpool/spas, to have aluminum construction even if scheduled otherwise; mounting hardware to be stainless steel.

C. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

D. Unless otherwise shown on drawings, for ceiling mounted air outlets with adjustable airflow pattern controllers mounted at a height of 12 feet or less, adjust the air outlets for horizontal air distribution, and adjust to vertical air distribution for ceiling height above 12 feet.

E. Exterior color of grilles per Architect. White finish if not otherwise scheduled or noted by Architect. Paint ductwork visible behind air outlets and inlets matte black.

F. Ceiling Membrane: Protect ceiling membrane per code. Fire caulk around openings. Provide listed radiation damper in rated roof/ceiling or floor/ceiling assemblies as required per code.

G. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

3.02 GRILLES, REGISTERS AND DIFFUSERS INSTALLATION

A. Coordinate with Architectural Reflected Ceiling Plan(s). Reflected ceiling plans determine final locations.

B. Install diffusers to ductwork with air tight connection. 18-inch straight duct section or acoustic plenum at connection. Provide square to round adapters where required for connection to round ducts.

C. Provide integral balancing dampers for diffusers, and grilles and registers where duct manual balancing dampers are not shown or specified.

END OF SECTION

SECTION 238143 – AIR SOURCE HEAT PUMPS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Split System Heat Pumps
2. Ductless Split System Heat Pump Units

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. AHRI 210/240 – Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
2. AHRI 270 – Sound Performance Rating of Outdoor Unitary Equipment (with Addendum 1).
3. NRCA: Provide roof curbs in accordance with NRCA.

1.06 WARRANTY

A. Warranty of materials and workmanship as outlined in Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Refrigeration Compressor(s) – 5-year warranty.

1.07 PACKAGED TERMINAL HEAT PUMP MOCK-UP

A. Install one unit that includes inside cabinet, wall sleeve, and wall louver.

B. Locate where directed.

C. Mock-up may remain as part of work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Split System Heat Pump:

1. Indoor Air Handling Units:

a. Bryant
b. Lennox International
c. Rheem
d. Trane
e. York

2. Outdoor Air-Cooled Heat Pump Units:

a. Lennox International
b. Bryant
c. Rheem
d. Trane
e. York

B. Ductless Split System Heat Pump Units:

1. Mitsubishi Electric
2. Daikin Applied
3. Sanyo
4. LG
5. Friedrich

2.02 SPLIT SYSTEM HEAT PUMP

A. Indoor fan unit matched to outdoor heat pump unit. Self-contained, packaged, factory-assembled, pre-wired unit with direct expansion evaporator coil, cabinet supply fan, filter housing and controls. Accessories, economizer assembly, etc. as scheduled and shown on Drawings.

B. Components:

1. Steel cabinet with baked enamel finish or galvanized steel; minimum 1/2-inch thick, 1-1/2# liner with cleanable facing or solid interior metal panel, filter housing suitable for 1-inch thick filter. Easily removable access panels.
2. Economizer/Mixing Box with damper actuator.

C. Refrigeration System: HFC Refrigerant or other refrigerant with zero ozone depletion potential (ODP).

D. Air System:

1. Supply Fan (Evaporator Fan): centrifugal multi-speed direct drive, ECM motor drive, or V-belt with internal vibration isolation.
2. Indoor Motor: Premium efficiency with permanently lubricated bearings thermal overload protection. Provide optional high static motor.
3. Indoor Coil: Seamless copper tubes expanded into aluminum fins. Galvanized or polymer drain pan sloped in all directions.
4. Filter: MERV 8, 1-inch thick, pleated, throw-away.
5. Supplemental Heat Coil:

    a. Electric Heat Coil: UL Listed with helix wound bare nichrome wire heating elements. Heat output and staging as scheduled. Power usage per stage is not to exceed 5 kilowatts. Staging of coil heat internally controlled.

E. Condensate:

1. Condensate pump kit.
2. Secondary drain pan; Condensate overflow shut-off float switch and external alarm.

F. Controls: Factory-wired to internal terminal strip or board for connection to programmable thermostat or Building Management System (BMS).

G. Electrical: Furnish magnetic contactors. Arrange for single point electrical connection. Provide all associated field wiring.

H. Outdoor Air-Cooled Heat Pump Units:

1. Coils: Seamless copper tubes with copper or aluminum plate fins mechanically bonded to tubes.
2. Fans: Direct driven, propeller type, arranged for vertical discharge, with safety guards. Motors: Permanently lubricated, on vibration isolators.
3. Compressor: Serviceable hermetic design, with external spring isolators, automatically reversible oil pump, located in a section separated from condenser fans and coil. Provide low ambient controls to 20 degrees F.
4. Refrigerant: HFC refrigerant or other refrigerant with zero ozone depletion potential (ODP.)
5. Controls: High- and low-pressure cut-out switches, compressor overload devices, anti-short cycle controls to prevent compressor from restarting for approximately five minutes after shutoff. Provide a transformer for control circuits. Provide automatic defrost controls that operate during heating, only when temperatures are below 36 degrees F, set to minimize energy use.

6. Casing: Galvanized steel, designed for outdoor installation. Finished with baked enamel. Provide openings for power and refrigerant connections. Panel: Removable to provide access for servicing.
7. Connections for liquid line, suction line, and power supply.

I. Outdoor Coil Defrost Control: Function on the basis of time and coil temperature. Timer to actuate a defrost mode if coil temperature is low enough to indicate frost condition. Defrost termination time maximum 10 minutes or when the defrost thermostat is satisfied. Electric resistance heaters operational automatically during the defrost cycle.

2.03 DUCTLESS SPLIT SYSTEM HEAT PUMP UNITS

A. General: The heat pump air conditioning system is a dual split type system. The system to consist of a slim silhouette, compact wall-mounted packaged evaporator with integral booster heater and matching Slim Line air cooled outdoor unit. The units listed by Electrical Testing Laboratories (ETL) and bear the ETL label. Wiring to be in accordance with the NEC. Rate the units in accordance with AHRI 210/240 and bear the AHRI label. Provide a full charge of R-410a or R-134 for 25-feet of refrigerant tubing in the condensing units. Provide a holding charge in the evaporator.

B. Performance: See Equipment Schedule on Drawings for performances/capacities.

C. Indoor Unit: Completely factory assembled and wired. The evaporator fan forward curve line flow fan direct driven by a single motor. The fans statically and dynamically balanced and run on permanently lubricated bearings.

1. Provide a manually adjustable change vane. The vane to have the ability to direct the air flow from horizontal to vertical.
2. The evaporator coil of nonferrous construction with smooth plate fins bonded to copper tubing. The tubing to have inner grooves for high efficiency heat exchange. Braze tube joints with phos-copper or silver alloy. Pressure test the coils at the factory. Provide a condensate pan with drain under the coil. Provide an integral booster heater to supplement the unit during the heating mode. The unit powered from the outdoor unit.
3. System Control: The control system for each indoor unit to consist of two microprocessors interconnected by a multiwire cable. One microprocessor factory wired and located within the indoor unit. It to have the capability of sensing return air temperature and indoor coil temperature; receive and process commands from the remote controller; control the booster heater; and control the outdoor unit. Simultaneous operation possible only when both units are in the same mode.
4. The microprocessor within the wall-mounted remote controller to sense room temperature; display setpoint and room temperature; provide two manually selected modes of cooling, normal and economy operation at 2 degrees F above setpoint; provide manual heating selection; provide continuous or automatic start/stop of system operation; night setback operation of 4 degrees F above setpoint for cooling and 4 degrees F below setpoint for heating; and manual or automatic fan speed control. Base automatic fan speed control upon the temperature difference between setpoint and room temperature maintaining lowest speed possible.
5. Control the heating system so that only warm air is discharged at the start of the heating cycle and during defrost. The booster heater to come on line only when the difference

between the setpoint and room temperature exceeds 5.4 degrees F. Heating switched back to the heat pump only when the difference drops back to less than 3.6F.

D. INDOOR UNIT – CEILING CONCEALED DUCTED

1. General:

   a. Ceiling-concealed ducted indoor fan coil design. 2-position, field adjustable return and fixed horizontal discharge supply with modulating linear expansion device.
   b. Factory assembled, wired and run tested. Factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. Self-diagnostic function, 3-minute time delay mechanism, and auto restart function.
   c. Indoor unit and refrigerant pipes pre-charged with dehydrated air before shipment from factory.

2. Unit Cabinet:

   a. Ceiling-concealed, ducted supply and return.
   b. Provisions for field installed, filtered outside air intake.

3. Evaporator Fan:

   a. One or two fan(s) direct driven by ingle motor.
   b. Statically and dynamically balanced, motor with permanently lubricated bearings.
   c. Minimum of two speed settings.
   d. Fan to be thermally protected.

4. Filter:

   a. Standard factory installed return air filter.

5. Evaporator Coil:

   a. Nonferrous construction with smooth plate fins on copper tubing with inner grooves for high efficiency heat exchange.
   b. Brazed tube joints with phos-copper or silver alloy.
   c. Pressure tested at factory.
   d. Condensate pan and drain under coil. Provide with integral condensate pump.
   e. Condensate gravity drained from fan coil, with available factory condensate pump.

E. Outdoor Coil Defrost Control: Function on the basis of time and coil temperature. Timer to actuate a defrost mode if coil temperature is low enough to indicate frost condition. Defrost termination time maximum 10 minutes or when the defrost thermostat is satisfied. Electric resistance heaters operational automatically during the defrost cycle.

F. Provide automatic defrost controls that operate during heating, only when temperatures are below 36 degrees F, set to minimize energy use.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Examine areas and conditions under which units are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Verify that ceiling system is ready to receive work and opening dimensions are as indicated on shop drawings.

C. Verify that electric power is available and of the correct characteristics.

D. Install in accordance with manufacturers written instructions and guidelines.

E. Coordinate installation of unit with building components to allow adequate airflow to/from the units and for maintenance clearances. Mount outdoor units on a concrete housekeeping pad if on grade, or on a built-up roofing curb flashed and sealed in accordance with roofing warranty requirements.

F. Provide adequate bracing and vibration isolation in accordance with seismic code requirements and acoustical engineers requirement.

G. Provide adequate drainage connections and routing for condensate piping to indirect waste receiver.

H. Provide shut off valves, site glasses, and routing pressure gauges, and all other appurtenances required for refrigerant system maintenance and operation.

I. Provide filters for indoor units. Where outdoor units are installed, within 20-feet of trees, flowers plants, animals or other pollen or dander producing items, provide filters for outdoor units.

J. Set initial temperature set points. Instruct operating personnel in adjustment of setpoints and controls.

K. See Division 01, General Requirements and Section 23 00 00, HVAC Basic Requirements for additional requirements.

L. Provide service and maintenance of units for one year from date of substantial completion.

M. Furnish to Owner, with receipt, for each packaged heating and cooling unit:

1. One set matched fan belts for each belt-driven fan.
2. One set filters for each unit.

END OF SECTION

SECTION 238200 – TERMINAL HEAT TRANSFER EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Electric Wall Heaters
2. Electric Unit Heater
3. Electric Duct Heaters

1.02 RELATED SECTIONS

A. Contents of Division 23, HVAC and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

1.06 WARRANTY

A. Warranty of materials and workmanship as outlined in Section 230000, HVAC Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 ELECTRIC WALL HEATERS

A. Manufacturers:

1. Trane
2. Markel
3. Qmark
4. Chromalox
5. Indeeco

B. Description: Wall mounted forced air unit heater, including enclosure for recessed mounting, fan and motor, heating elements and wall box. UL listed and wired per NEC.

C. Cabinet: 20 gauge zinc coated steel, 16 gauge painted exterior grille.

D. Fan and Motor: Propeller type fan, totally enclosed motor with permanently lubricated bearings and thermal overload protection, vandal proof.

E. Heating Element: Sealed tubular type with finned heating elements, manual reset thermal limit safety switch, fan purge limit to dissipate residual heat on heater shutdown.

F. Control:

1. Wall mounted line voltage thermostat with accessible disconnect switch in face of unit.

2.02 ELECTRIC UNIT HEATER

A. Manufacturers:

1. Trane
2. Markel
3. Qmark
4. Chromalox
5. Modine
6. Indeeco
7. Reznor

B. Description: Electric unit heater wired internally for single point connection. Horizontal or vertical air delivery, complete with fan, motor, heavy gauge steel casing with adjustable discharge louvers, mounting bracket, tubular finned heating element, automatic reset thermal overloads, and control circuit transformer. UL listed and wired per NEC.

C. Components:

1. Chassis: Fabricated of 14 gauge cold rolled steel with fan guard.
2. Heating Section: Liquid filled with low watt density immersion type copper sheathed elements hermetically sealed into the core made of steel with aluminum fins. Heat transfer fluid of ethylene glycol solution.
3. Supply Fan: Propeller type with aluminum blades, direct drive.
4. Supply Fan Motor: Permanently lubricated ball bearing type, 1750 RPM, open drip proof, same voltage and phase as heating element.
5. Outlet Grille: 14 gauge steel adjustable louvers with minimum position stops.
6. Mounting: Bracket(s) and appurtenances for wall mounting.

D. Control: Remote thermostat with summer fan switch. 24V control circuit.

2.03 ELECTRIC DUCT HEATERS

A. Manufacturers:

1. Indeeco
2. Markel
3. Dell Heatrix
4. Qmark
5. Chromalox
6. Nailor Industries
7. Valley Industries
8. Warren
9. Electric duct heaters supplied as integral components of terminal units, heat pumps, etc. are acceptable.

B. Description:

1. Iron-free resistance wire, 80 percent nickel and 20 percent chromium, spaced no more than 4-inches apart with ceramic insulators and bushings, supported in aluminum steel frame suitable for duct installation. Test dielectrically for 1000V plus twice the rated voltage.
2. Housing: NEMA 1 construction of corrosion resistant steel with hinged, latching cover.
3. Power Control: Fully proportional SCR.
4. Control Voltage: 24 volts.
5. Safeties:

    a. Overcurrent Protection: Built-in and prewired fuses with one overcurrent device for each 48 ampere circuit except with only one overcurrent device required for entire heater for those heaters rated 48 amperes or less. Fuses sized for available fault current with 20,000 AIC rating minimum. Supplier to coordinate with Division 26, Electrical.
    b. Disc-type automatic reset thermal cutout for primary protection.
    c. For secondary protection, furnish a sufficient number of heat elements in case the primary cutout fails.
    d. Provide thermal cutout and heat limiters serviceable through the terminal box without removing the heater.

6. Terminal box with hinged, solid cover, duct mounted or remote as indicated on drawings.
7. Built-in Accessories: Factory wired with terminal blocks as required for field connections.
8. Contactors: Mercury-type to de-energize heater circuits; 3-pole line break for three phase and 1-pole break for single phase. Furnish a contactor for each heater circuit (step).
9. Air Flow Switch: Pressure type to de-energize heater in the event of inadequate air flow. Switch located to function down to 25 percent of maximum air volume on discharge side of terminal unit.
10. Transformer: With primary fuse protection to supply control voltage.
11. Built-in disconnect switch.

12. Frame Style: Flanged medium pressure application. Slip-in or flanged for low pressure application, suitable for lined ductwork.
13. Provide a NEMA 4 weatherproof terminal box. Box to be all molded construction, complete with rustproof painted finish and gasketed cover with hold down clamps. Provide rigid insulation on back of the terminal box.

C. Controls:

1. Discharge air temperature sensor stages heat to maintain discharge air temperature setpoint.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Avoid interference with structure and with work of other trades, preserving adequate headroom and clearing doors and passageways. Check each piece of equipment for defects, verifying that items function properly and that adjustments have been made.

B. Prior to acceptance, thoroughly clean exposed portions of terminal heat transfer equipment, remove shipping labels and traces of foreign substance. Touch up scratched surfaces of radiant panels with factory matching paint.

3.02 ELECTRIC WALL HEATERS INSTALLATION

A. Damaged Coils: Make every effort to prevent damage to both built-up coils and coils of packaged equipment. Comb damaged coil fins to be straight.

B. Install per manufacturer's instructions. Comply with NEC and UL listings.

C. Install heaters in place with box trim flush with finished wall.

D. Install thermostat as shown on drawings. Provide control wiring from thermostat to unit.

3.03 ELECTRIC UNIT HEATER INSTALLATION

A. Unit Heaters: Suspend from structure with 5/8-inch diameter rods.

B. Damaged Coils: Make every effort to prevent damage to both built-up coils and coils of packaged equipment. Comb damaged coil fins to be straight.

C. Suspend from structure with 5/8-inch diameter rods and per manufacturer instructions.

D. Install thermostat as shown on drawings. Provide control wiring from thermostat to unit.

3.04 ELECTRIC DUCT HEATERS INSTALLATION

A. Damaged Coils: Make every effort to prevent damage to both built-up coils and coils of packaged equipment. Comb damaged coil fins to be straight.

B. Support units rigidly from structure. Seal air tight around frame.

C. Provide access to each side of elements.

D. Electric coils to comply with voltage, wattage, number of steps and accessories as indicated, and installed in uniform air flow entering and leaving.

E. Provide controls that are completely accessible as installed.

END OF SECTION

SECTION 260000 – ELECTRICAL BASIC REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work included in 26 00 00, Electrical Basic Requirements applies to Division 26, Electrical work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of electrical systems for proposed project.

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, Addenda, and Owner/Contractor Agreement. Confirm requirements before commencement of work.

C. Definitions:

1. Provide: To furnish and install, complete and ready for intended use.
2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.
4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent", substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer prior to submitting bids for substituted items.
5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's Authorized Representative, and other reviewing entity whose approval is required to obtain systems acceptance.

1.02 RELATED SECTIONS

A. Contents of Section applies to Division 26, Electrical Contract Documents.

B. Related Work:

1. Additional conditions apply to this Division including, but not limited to:

a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
b. Drawings
c. Addenda
d. Owner/Architect Agreement
e. Owner/Contractor Agreement

f. Codes, Standards, Public Ordinances and Permits

1.03 REFERENCES AND STANDARDS

A. References and Standards per Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, individual Division 26, Electrical Sections and those listed in this Section.

B. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:

1. State of Washington:

a. IBC – International Building Code
b. IFC – International Fire Code
c. IMC – International Mechanical Code
d. NEC – National Electrical Code
e. UPC – Uniform Plumbing Code
f. WAC – Washington Administrative Code
g. WSEC – Washington State Energy Code

C. Reference standards and guidelines include but are not limited to the latest adopted editions from:

1. ABA – Architectural Barriers Act
2. ADA – Americans with Disabilities Act
3. ANSI – American National Standards Institute
4. APWA – American Public Works Association
5. ASCE – American Society of Civil Engineers
6. ASHRAE Guideline 0, the Commissioning Process
7. ASTM – ASTM International
8. CFR – Code of Federal Regulations
9. EPA – Environmental Protection Agency
10. ETL – Electrical Testing Laboratories
11. FCC – Federal Communications Commission
12. FM – FM Global
13. IBC – International Building Code
14. IEC – International Electrotechnical Commission
15. IEEE – Institute of Electrical and Electronics Engineers
16. IES – Illuminating Engineering Society
17. ISO – International Organization for Standardization
18. MSS – Manufacturers Standardization Society
19. NEC – National Electric Code
20. NECA – National Electrical Contractors Association
21. NEMA – National Electrical Manufacturers Association
22. NETA – National Electrical Testing Association
23. NFPA – National Fire Protection Association
24. OSHA – Occupational Safety and Health Administration
25. UL – Underwriters Laboratories Inc.

D. See Division 26, Electrical individual Sections for additional references.

1.04 SUBMITTALS

A. See Division 01, General Requirements for Submittal Procedures as well as individual Division 26, Electrical Sections.

B. Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.

C. In addition:

1. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.
2. Provide product submittals and shop drawings in electronic format only. Electronic format must be posted to ftp site. For electronic format, provide one file per division containing one bookmarked PDF file with each bookmark corresponding to each Specification Section. Arrange bookmarks in ascending order of Specification Section number. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. All transmissions/submissions to be submitted to Architect. Deviations will be returned without review.

    a. Provide separate submittals for power system study (per Specification Section 26 05 73) and electrical equipment (for example, switchboards and panelboards).
    b. Provide separate submittals for lighting control cutsheets, and for lighting control shop drawings.

3. Product Data: Provide manufacturer's descriptive literature for products specified in Division 26, Electrical Sections.
4. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the Specifications and Drawings.

    a. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.
    b. Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference individual Division 26, Electrical specification Sections for specific items required in product data submittal outside of these requirements.

c. See Division 26, Electrical individual Sections for additional submittal requirements outside of these requirements.

5. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of these additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.
6. Resubmission Requirements: Make corrections or changes in submittals as required, and in consideration of Engineer's comments. Identify Engineer's comments and provide an individual response to each of the Engineer's comments. Cloud changes in the submittals and further identify changes which are in response to Engineer's comments.
7. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support. Indicate manufacturer's installation and support requirements to meet ASCE 7-16 requirements for non-structural components. Provide engineered seismic drawings and equipment seismic certification. Equipment Importance Factor as specified in Division 01 and in Structural documents.
8. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 26, Electrical Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals. Electric motors are supplied and installed by Division 23 unless otherwise specified. During shop drawing stage of the project, verify correct disconnect sizes, conductor sizes, etc., and bring any discrepancies to the attention of the Mechanical trade. Be responsible for any modifications to electrical equipment or installations as a result of equipment incompatibility discovered after shop drawing review.
9. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
10. Substitutions and Variation from Basis of Design:

    a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
    b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid, including resulting charges for work performed under other Divisions, will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.

11. Shop Drawings: Provide coordinated shop drawings which include physical characteristics of all systems, device layout plans, and control wiring diagrams. Reference individual Division 26, Electrical specification Sections for additional requirements for shop drawings outside of these requirements.

a. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.

12. Samples: Provide samples when requested by individual Sections.
13. Resubmission Requirements:

    a. Make any corrections or change in submittals when required. Provide submittals as specified. The Engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
    b. Resubmit for review until review indicates no exception taken or "make corrections as noted".

14. Operation and Maintenance Manuals, Owner's Instructions:

    a. Submit, at one time, one bound copy and electronic files (PDF format) of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.

        1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.
        2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment.
        3) Include Warranty per Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.
        4) Include product certificates of warranties and guarantees.
        5) Include copy of complete parts list for equipment. Include available exploded views of assemblies and sub assemblies.
        6) Include commissioning reports.
        7) Include copy of startup and test reports specific to each piece of equipment.
        8) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.

    b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 26 00 00, Electrical Basic Requirements, Demonstration.

c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

15. Record Drawings:

a. Maintain at site at least one set of drawings for recording “As-constructed” conditions. Indicate on drawings changes to original documents by referencing revision document, and include buried elements, location of conduit, and location of concealed electrical items. Include items changed by field orders, supplemental instructions, and constructed conditions.
b. Record Drawings are to include equipment and fixture/connection schedules that accurately reflect "as constructed or installed" for project.
c. At completion of project, input changes to original project on CAD Drawings and make one set of black-line drawings created from CAD Files in version/release equal to contract drawings. Submit CAD Files and drawings upon substantial completion.
d. At completion of project, show changes and deviations from the Drawings in red on one set of black-line drawings. Include written Addendums, RFIs, and change order items. Make changes to Drawings in a neat, clean, and legible manner.
e. See Division 26, Electrical individual Sections for additional items to include in record drawings.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Work and materials installed to conform with all local, State and Federal codes, and other applicable laws and regulations. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.

B. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

C. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e. distribution equipment, duct banks, light fixtures, etc.) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.

D. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

E. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.

F. Provide products that are UL listed.

1.06 WARRANTY

A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

1.07 COORDINATION DOCUMENTS

A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, plumbing equipment/fixtures, fire sprinklers, plumbing, lights, cable tray and electrical services with architectural and structural requirements, and other trades (including ceiling suspension and tile systems), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.

B. Advise Architect in event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

C. Submit final Coordination Drawings with changes as Record Drawings at completion of project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer.

2.02 STANDARDS OF MATERIALS AND WORKMANSHIP

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL listed and labeled or be approved by State, County, and City authorities prior to procurement and installation.

B. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

C. Hazardous Materials:

1. Comply with local, State of Washington, and Federal regulations relating to hazardous materials.
2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.
3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.

PART 3 - EXECUTION

3.01 ACCESSIBILITY AND INSTALLATION

A. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Install equipment requiring access (i.e., junction boxes, light fixtures, power supplies, motors, etc.) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in passageways, doorways, scuttles or crawlspaces which would impede or block the intended usage.

C. Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing, and coordination with other trades and disciplines.

D. Earthwork:

1. Confirm Earthwork requirements in Contract Documents. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:

    a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with related earthwork Sections. Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.
    b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.
    c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

E. Firestopping:

1. Confirm requirements in Division 07, Thermal and Moisture Protection. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:

a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

F. Plenums:

1. In plenums, provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.

G. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

H. Provide miscellaneous supports/metals required for installation of equipment and conduit.

3.02 SEISMIC CONTROL

A. Confirm Seismic Control requirements in Division 01, General Requirements, Structural documents, and individual Division 26 Electrical Sections.

B. General:

1. Earthquake resistant designs for Electrical (Division 26) equipment and distribution, i.e. power distribution equipment, generators, UPS, etc. to conform to regulations of jurisdiction having authority.
2. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.
3. Provide stamped shop drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for conduit and equipment. Submit shop drawings along with equipment submittals.
4. Provide stamped shop drawings from licensed Structural Engineer of seismic flexible joints for conduit crossing building expansion or seismic joints. Submit shop drawings along with seismic bracing details.
5. Provide means to prohibit excessive motion of electrical equipment during earthquake.

3.03 REVIEW AND OBSERVATION

A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:

1. Underground conduit installation prior to backfilling.
2. Prior to covering walls.
3. Prior to ceiling cover/installation.
4. When main systems, or portions of, are being tested and ready for inspection by AHJ.

C. Final Punch:

1. Prior to requesting a final punch visit from the Engineer, request from Engineer the Electrical Precloseout Checklist, complete the checklist confirming completion of systems' installation, and return to Engineer. Request a final punch visit from the Engineer, upon Engineer's acceptance that the electrical systems are ready for final punch.
2. Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

3.04 CUTTING AND PATCHING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In the absence of specific requirements in Division 01, General Requirements, comply with individual Division 26, Electrical Sections and the following:

1. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to Project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).
2. Cutting, patching and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section will be performed by skilled craftspeople of each respective trade in conformance with appropriate Division of Work.
3. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.
4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing conduit and devices are removed as part of this project. Where alterations disturb lawns, paving, and/or walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.
5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

3.05 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

3.06 DELIVERY, STORAGE AND HANDLING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:

1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust. Products and/or materials that become damaged due to water, dirt, and/or dust as a result of improper storage and handling to be replaced before installation.
2. Protect equipment to avoid damage. Close conduit openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.
3. Protect bus duct and similar items until in service.

3.07 DEMONSTRATION

A. Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, and individual Division 26, Electrical Sections.

B. Upon completion of work and adjustment of equipment, test systems and demonstrate to Owner's Authorized Representative, Architect, and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

C. Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

3.08 CLEANING

A. Confirm Cleaning requirements in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Upon completion of installation, thoroughly clean electrical equipment, removing dirt, debris, dust, temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

3.09 INSTALLATION

A. Confirm Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Install equipment and fixtures in accordance with manufacturers' installation instructions, plumb and level and firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.

C. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

D. Provide miscellaneous supports/metals required for installation of equipment.

3.10 PAINTING

A. Confirm requirements in Division 01, General Requirements and Division 09, Finishes. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:

1. Ferrous Metal: After completion of work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces (i.e., hangers, hanger rods, equipment stands, etc.) with one coat of black asphalt varnish for exterior or black enamel for interior, suitable for hot surfaces.
2. In Electrical Room, on roof or other exposed areas, equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect.
3. See individual equipment Specifications for other painting.
4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding or patching to match original.
5. Conduit: Clean, primer coat and paint interior/exterior conduit exposed in public areas with two coats paint suitable for metallic surfaces. Color selected by Architect.
6. Covers: Covers such as manholes, vaults and the like will be furnished with finishes which resist corrosion and rust.

3.11 DEMOLITION

A. Confirm requirements in Division 01, General Requirements and Division 02, Existing Conditions. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:

1. It is the intent of these documents to provide necessary information and adjustments to electrical system required to meet code, and accommodate installation of new work.
2. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas. Owner will cooperate to best of their ability to assist in coordinated schedule, but will remain final authority as to time of work permitted.

3. Examination:

    a. Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to locate and preserve utilities. Replace damaged items with new material to match existing.
    b. Verify that abandoned wiring and equipment serve only abandoned facilities.
    c. Demolition drawings are based on casual field observation and existing record documents.

        1) Verify accuracy of information shown prior to bidding and provide such labor and material as is necessary to accomplish work.
        2) Verify location and number of electrical outlets, luminaires, panels, etc. in field.

    d. Report discrepancies to Architect before disturbing existing installation.

        1) Promptly notify Owner if utilities are found which are not shown on Drawings.

4. Execution:

    a. Remove existing luminaires, switches, receptacles, and other electrical equipment and devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition unless shown as retained or relocated on Drawings.
    b. Provide temporary wiring and connections to maintain electrical continuity of existing systems during construction. Remove or relocate electrical boxes, conduit, wiring, equipment, and luminaires, as encountered in removed or remodeled areas in existing construction affected by this work.
    c. Remove and restore wiring which serves usable existing outlets clear of construction or demolition.
    d. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, provide new conduit and wire to bypass inaccessible junction boxes and abandoned outlets.
    e. If existing conduits pass through partitions or ceiling which are being removed or remodeled, provide new conduit and wire to reroute clear of construction or demolition and maintain service to existing load.
    f. Extend circuiting and devices in existing walls to be furred out.
    g. Remove abandoned wiring to source of supply.
    h. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
    i. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.
    j. Disconnect and remove abandoned panelboards and distribution equipment.
    k. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
    l. Existing lighting which is to remain, leave luminaires in proper working order.
    m. Repair adjacent construction and finishes damaged during demolition work.

n. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

3.12 ACCEPTANCE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:

1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:

a. Cleaning
b. Operation and Maintenance Manuals
c. Training of Operating Personnel
d. Record Drawings
e. Warranty and Guaranty Certificates
f. Start-up/Test Document and Commissioning Reports

3.13 FIELD QUALITY CONTROL

A. Confirm Field Quality Control requirements in Division 01, General Requirements, Section 26 00 00, Electrical Basic Requirements and individual Division 26, Electrical Sections.

B. Tests:

1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in operation and maintenance manuals.
2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

END OF SECTION

SECTION 260509 – EQUIPMENT WIRING

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Equipment connections or other Divisions of the Contract.

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition:

1. Verify mechanical and utilization equipment electrical characteristics with Drawings and equipment submittals prior to ordering equipment. Submit confirmation of this verification as a part of, or addendum to, the electrical product submittals.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements apply to this Section.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials and Equipment for Equipment Wiring: As specified in individual Sections.

2.02 GENERAL

A. Unless otherwise noted, the following voltage and phase characteristics apply to motors:

1. 3/4 HP and Under: 120 volt, 1 phase.
2. 1 HP and Less than 5 HP Loads: 240 volt, 3 phase.
3. 5 HP and Over: 240 volt, 3 phase.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to submittal of product data for electrical distribution equipment, obtain and examine product data and shop drawings for equipment furnished by the Owner and by other trades on the project. Update the schedule of equipment electrical connections accordingly, noting proper ratings for overcurrent devices, fuses, safety disconnect switches, conduit and wiring, and the like. As a minimum, this requirement applies to equipment furnished by Owner and equipment furnished under the following divisions of work under this contract:

1. Division 8, Openings
2. Division 11, Equipment
3. Division 22, Plumbing
4. Division 23, HVAC, Heating, Ventilating and Air Conditioning

3.02 INSTALLATION

A. Do not install unrelated electrical equipment or wiring on mechanical equipment without prior approval of Architect.

B. Provide moisture tight equipment wiring and switches in ducts or plenums used for environmental air.

C. Connect motor and appliance/utilization equipment complete from panel to motor/equipment as required by code.

D. Install motor starters and controllers for equipment furnished by others.

E. Appliance/Utilization Equipment:

1. Provide appropriate cable and cord cap for final connection unless equipment is provided with same. Provide receptacle configured to receive cord cap.

2. Verify special purpose outlet NEMA configuration and ampere rating with equipment supplier prior to ordering wiring devices and coverplates.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Division 01, General Requirements.

3.04 SYSTEMS STARTUP

A. Provide field representative to prepare and start equipment.

1. Test and correct for proper rotation of polyphase motors.

B. Adjust for proper operation within manufacturer's published tolerances.

C. Demonstrate proper operation of equipment to Owner's Authorized Representative.

END OF SECTION

SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Lugs and Pads
2. Wires and Cables
3. Connectors

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Cable insulation test reports in project closeout documentation.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Lugs and Pads:

1. Anderson
2. Ilsco
3. Panduit
4. Thomas & Betts
5. 3M
6. Or approved equivalent.

B. Wires and Cables:

1. General:

a. General Cable
b. Okonite
c. Southwire
d. Encore Wire
e. Or approved equivalent.

2. Metal Clad Cable – Type MC:

a. Alflex
b. AFC
c. General Cable
d. Southwire
e. Encore Wire
f. Or approved equivalent.

C. Connectors:

1. Anderson Power Products
2. Burndy
3. Ilsco
4. 3M
5. Thomas & Betts
6. Or approved equivalent.

2.02 LUGS AND PADS

A. Ampacity: Cross-sectional area of pad for multiple conductor terminations to match ampere rating of panelboard bus or equipment line terminals.

B. Copper Pads: Drilled and tapped for multiple conductor terminals.

C. Lugs: Compression type for use with stranded branch circuit or control conductors; mechanical type for use with solid branch and feeder circuit conductors.

2.03 WIRES AND CABLES

A. Building Wires:

1. Copper: Soft-drawn with conductivity of not less than 98 percent IACS at 20 degrees C (68 degrees F). 600 volt rated throughout. Conductors 12 AWG and 10 AWG, solid. Conductors 8 AWG and larger, stranded. 12 AWG minimum conductor size. Minimum insulation rating of 90 degrees C. Insulation Type: THHN/THWN-2.

B. Phase color to be consistent at feeder terminations; A-B-C, top to bottom, left to right, front to back.

C. Color Code Conductors as Follows:

PHASE	**240 VOLT DELTA**
A	Black
B	Orange (High Leg)
C	Blue
Neutral	White
Ground	Green
Isolated Ground	N/A

D. MC Cable:

1. Standard: High strength galvanized steel flexible armor. Full length minimum size No. 12 copper ground wire, copper dual rated THHN/THWN-2, full length tape marker phase/circuit identification on cable armor. Short circuit throat insulators, mechanical compression termination.

E. AC Cable (Armored Cable): Not allowed.

F. NMB Cable: Not allowed.

2.04 CONNECTORS

A. Split bolt connectors not allowed.

B. Conductor Branch Circuits: Wire nuts with integral spring connectors for conductors 12 AWG through 8 AWG. Push-in type connectors where conductors are not required to be twisted together are not acceptable.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Install per manufacturer instructions and NEC.

B. Field Quality Control:

1. Test conductor insulation on feeders of 100 amp and greater for conformity with 1000 volt megohmmeter. Use Insulated Cable Engineers Association testing procedures. Minimum insulation resistance acceptable is 1 megohm for systems 600 volts and below. Notify Architect if insulation resistance is less than 1 megohm.
2. Test Report: Prepare a typed tabular report indicating the testing instrument, the feeder tested, amperage rating of the feeder, insulation type, voltage, the approximate length of the feeder, conduit type, and the measured resistance of the megohmmeter test. Submit test reports with project closeout documents.
3. Inspect and test in accordance with NETA Standard ATS, except Section 4.
4. Perform inspections and tests listed in NETA Standard ATS, Section 7.3.2.

3.02 LUGS AND PADS

A. Thoroughly clean surfaces to remove all dirt, oil, grease, or paint.

B. Use torque wrench to tighten per manufacturer's directions.

3.03 WIRES AND CABLES

A. General:

1. Do not install or handle thermoplastic insulated wire and cable in temperatures below -10 degrees C (14 degrees F). Do not handle thermoset insulated wire and cable in temperatures below -40 degrees C (-40 degrees F). All wire and cable must be acclimated to temperatures above freezing for no less than 24 hours prior to installation.
2. Install conductors in raceways having adequate, code size cross-sectional area for wires indicated.
3. Install conductors with care to avoid damage to insulation.
4. Do not apply greater tension on conductors than recommended by manufacturer during installation.
5. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation. Do not use pulling compounds for installation of conductors connected to GFCI circuit breakers or GFCI receptacles.
6. Conductor Size and Quantity:

    a. Install no conductors smaller than 12 AWG unless otherwise shown.
    b. Provide required conductors for a fully operable system.
    c. Power Circuits: No. 12 AWG minimum, except as follows:

        1) No. 10 AWG for 15A, 120V circuits longer than 100-feet.

2) No. 8 AWG for 15A, 120V circuits longer than 150-feet.
3) No. 10 AWG for 20A, 120V circuits longer than 70-feet.
4) No. 8 AWG for 20A, 120V circuits longer than 100-feet.

d. When exact run lengths are determined for all branch circuits, and prior to installation of the conductors, ensure that the maximum voltage drop, based on 80 percent of the circuit protective device, does not exceed 3 percent. Increase wire size from #12AWG, if necessary, to ensure that the 3 percent voltage drop is not exceeded.

7. Provide dedicated neutrals (one neutral conductor for each phase conductor) in all 120V circuits.

B. Conductors in Cabinets:

1. Cable and tree wires in panels and cabinets for power and control. Use plastic ties in panels and cabinets.
2. Tie and bundle feeder conductors in wireways of panelboards.
3. Hold conductors away from sharp metal edges.

C. Homeruns:

1. Do not change intent of branch circuit homeruns without approval. Homeruns for 20A branch circuits may be combined to a maximum of six current carrying conductors including neutral conductors in homeruns. Apply derating factors as required per NEC. Increase conductor size as needed.
2. MC cable homeruns are not allowed.

D. Identify wire and cable under the provisions of Section 26 05 53, Identification for Electrical Systems. Identify each conductor with its panel and circuit number as indicated.

E. Exposed cable is not allowed.

F. All cable must be run parallel or perpendicular to building lines and hidden from view when possible. Where installed in tray each power cable is to be identified with Lamacoid nametag engraved with identification of equipment being fed. Tag to be fastened to cable using tie-wraps. Provide nametag at each floor level.

G. Do not install PVC jacketed cables in return air plenums, unless they are specially rated plenum cables.

H. Use of MC Cable is limited to the following conditions. Installations that do not comply with the following conditions are to be removed and replaced with no additional expense to the Owner.

1. 15 and 20 amp branch wiring where following conditions apply:

a. Use MC cable for final flexible connections from junction or outlet boxes to recessed fixtures. Do not use MC cables to loop between fixtures, except where it is not practical to provide conduit connections between boxes or where existing inaccessible ceilings prevent installation of conduit runs. Each individual luminaire

is to be serviced by an individual cable drop from the associated junction box in the ceiling space. Maximum length 6-feet of MC cable. Luminaire drops secured to, and supported by, the building structure with nylon tie wraps. The use of the ceiling suspension system for support of any type of cabling is not permitted.

b. MC cable may be routed in the void space above hard lid ceilings, and routed within wall cavities below glazing, provided NEC requirements are otherwise met, and a minimum one 0.75-inch conduit is routed from nearest accessible ceiling space to inaccessible location, terminating in a j-box with blank faceplate, for future circuits.

3.04 CONNECTORS

A. Install to assure a solid and safe connection.

B. Select hand twist connectors for wire size and install tightly on conductors.

C. Install compression connectors using methods and tools recommended by the manufacturer.

D. Do not install stranded conductors under screw terminals unless compression lugs are installed.

E. Do not connect wiring without UL listed connectors that are listed for the purposes.

END OF SECTION

SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Grounding Electrodes
2. Connectors and Accessories
3. Grounding Conductor

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Test reports of ground resistance for service and separately derived system grounds.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Comply with the requirements of ANSI/NFPA 70.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Grounding Electrodes:

1. Erico
2. Thomas & Betts
3. Talley
4. Or approved equivalent.

B. Connectors and Accessories:

1. Burndy Hyground Compression System
2. Erico/Cadweld
3. Amp Ampact Grounding System
4. Pipe Grounding Clamp:

    a. Burndy GAR Series
    b. O Z Gedney
    c. Thomas & Betts
    d. Or approved equivalent.

C. Grounding Conductor

1. General Cable
2. Okonite
3. Southwire
4. Or approved equivalent

2.02 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, minimum 3/4-inch diameter, 10-feet long, tapered point, chamfered top.

2.03 CONNECTORS AND ACCESSORIES

A. Grounding Connectors: Hydraulic compression tool applied connectors or exothermic welding process connectors or powder actuated compression tool applied connectors.

B. Pipe Grounding Clamp: Mechanical ground connector with cable parallel or perpendicular to pipe.

2.04 GROUNDING CONDUCTOR

A. Grounding Electrode Conductor: Soft-draw bare stranded copper for wire sizes larger than #10 AWG Bare. Solid copper for wire sizes #10 AWG and smaller.

B. Equipment Grounding Conductor: Green insulated, insulation type to match that of associated feeder or branch circuit wiring, size as indicated on drawings.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Verify site conditions prior to beginning work.

B. Bond Sections of service equipment enclosure to service ground bus.

C. Separately Derived Systems: Ground each separately derived system per NEC Article 250.

D. Corrosion inhibitors: Apply a corrosion inhibitor to contact surfaces when making grounding and bonding connections. Use corrosion inhibitor appropriate for protecting a connection between metals used.

E. Grounding system resistance to ground not to exceed 5 ohms. Make necessary modifications or additions to grounding electrode system for compliance. Submit final tests to assure that this requirement is met.

F. Resistance of grounding electrode system: measure using a four-terminal fall-of-potential method as defined in IEEE 81. Take ground resistance measurements before electrical distribution system is energized and in normally dry conditions, not less than 48 hours after last rainfall. Take resistance measurements of separate grounding electrode systems before systems are bonded together below grade. Combined resistance of separate systems may be used to meet required resistance, but specified number of electrodes must still be provided.

G. Inspect and test in accordance with NETA Standard ATS, Except Section 4.

H. Perform inspections and tests listed in NETA Standard AB, Section 7.13.

3.02 GROUNDING ELECTRODES INSTALLATION

A. Concrete-Encased Electrode (“Ufer Ground”):

1. From service equipment ground bus provide grounding electrode conductor to footing/foundation rebar.
2. Bond #4 grounding electrode conductor to one minimum 20-foot long, 3/4-inch diameter independent steel rebar(s).
3. Protect grounding electrode conductor from footing/foundation to service equipment grounding bus with rigid PVC conduit where grounding electrode conductor passes through concrete floor or other concrete structure. Do not use rigid metal conduit for grounding electrode conductor protection.
4. Coordinate bonding of rebar in base of building concrete footing with installer prior to placement of concrete.

B. Ground Rod Electrode:

1. Verify that final backfill and compaction have been completed before driving rod electrodes.
2. Bond #6 grounding electrode conductor to driven ground rods as indicated on Drawings.
3. Tap at center ground rod and extend grounding electrode conductor to service grounding bus. Install grounding electrode conductor to service grounding bus in rigid PVC conduit for physical protection where grounding electrode conductor passes through concrete floor or other concrete structure.

C. Metal Underground Water Service: Bond water service pipe to service equipment ground bus or to the grounding electrode system. Connect to water pipe on utility side of isolating fittings or meters, bond across water meters.

D. Other Metal Piping Systems: Bond gas piping system, fire sprinkler piping system and other metal piping systems to service equipment ground bus or to the grounding electrode system.

E. Bond together metal siding not attached to grounded structure; bond to grounding electrode system.

3.03 CONNECTORS AND ACCESSORIES INSTALLATION

A. Install per manufacturer's instructions.

3.04 GROUNDING CONDUCTOR INSTALLATION

A. Raceways:

1. Ground metallic raceway systems. Bond to ground terminal with code size jumper except where code size or larger equipment grounding conductor is included with circuit, use grounding bushing with lay-in lug.
2. Connect metal raceways, which terminate within an enclosure but without mechanical connection to enclosure, by grounding bushings and ground conductor to grounding bus.
3. Where equipment supply conductors are in flexible metallic conduit, install stranded copper equipment grounding conductor from outlet box to equipment frame.
4. Install equipment grounding conductor, code size minimum unless noted on drawings, in metallic and nonmetallic raceway systems.

B. Feeders and Branch Circuits:

1. Provide continuous green insulated copper equipment grounding conductors for feeders and branch circuits.
2. Where installed in a continuous solid metallic raceway system and larger sizes are not detailed, provide insulated equipment grounding conductors for feeders and branch circuits sized in accordance with the latest adopted edition of NEC Article 250, Table 250-122.

C. Bond boxes, cabinets, enclosures and panelboard equipment grounding conductors to enclosure with specified conductors and lugs. Install lugs only on thoroughly cleaned contact surfaces.

D. Motors, Equipment and Appliances: Install code size equipment grounding conductor to (motor) equipment frame or manufacturer's designated ground terminal.

E. Receptacles: Connect ground terminal of receptacle and associated outlet box to equipment grounding conductor. Self grounding nature of receptacle devices does not eliminate equipment grounding conductor bolted to outlet box.

END OF SECTION

SECTION 260533 – RACEWAYS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Rigid Metal Conduit (RMC)
2. Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Metal Conduit
3. Electrical Metallic Tubing (EMT)
4. Flexible Metal Conduit (FMC)
5. Liquidtight Flexible Metal Conduit (LFMC)
6. Electrical Polyvinyl Chloride (PVC) Conduit
7. Conduit Fittings

B. Provide a complete system of conduit and fittings, with associated couplings, connectors, and fittings, as shown on Drawings and described in these Specifications.

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Section 26 05 34, Boxes
2. Section 26 05 43, Electrical Vaults and Underground Raceways

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 26000, Electrical Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.07 DEFINITIONS

A. Raceway system is defined as consisting of conduit, tubing, duct, and fittings including but not limited to connectors, couplings, offsets, elbows, bushings, expansion/deflection fittings, and other components and accessories. Complete electrical raceway installation before starting the installation of conductors and cables.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Rigid Metal Conduit (RMC):

1. Allied Tube & Conduit
2. Beck Manufacturing Inc.
3. Picoma
4. Wheatland Tube Company
5. Or approved equivalent.

B. Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit:

1. Allied Tube & Conduit
2. Thomas & Betts Corporation
3. Robroy Industries
4. O'kote Inc.
5. Or approved equivalent.

C. Electrical Metallic Tubing (EMT):

1. Allied Tube & Conduit
2. Beck Manufacturing WL
3. Picoma
4. Wheatland Tube Company
5. Or approved equivalent.

D. Flexible Metal Conduit (FMC):

1. AFC Cable Systems Inc.
2. Electri-Flex Company
3. International Metal Hose
4. Or approved equivalent.

E. Liquidtight Flexible Metal Conduit (LFMC):

1. AFC Cable Systems Inc.
2. Electri-Flex Company
3. International Metal Hose
4. Or approved equivalent.

F. Electrical Polyvinyl Chloride (PVC) Conduit:

1. AFC Cable Systems Inc.
2. Electri-Flex Company
3. International Metal Hose
4. JM Eagle
5. Or approved equivalent.

G. Conduit Fittings:

1. Bushings:

a. Insulated Type for Threaded Raceway Without Factory Installed Plastic Throat Conductor Protection:

1) Thomas & Betts 1222 Series
2) O-Z Gedney B Series
3) Or approved Equivalent.

2. Raceway Connectors and Couplings:

a. Thomas & Betts Series
b. O-Z Gedney Series
c. Or approved Equivalent.

3. Expansion/Deflection Fittings:

a. EMT: O-Z Gedney Type TX
b. RMC: O-Z Gedney Type AX, DX and AXDX, Crouse & Hinds XD
c. PVC: O-Z Gedney Type DX with PVC adapters, Carlon E945 Series, Kraloy OPEJ Series
d. Or approved equivalent.

2.02 RIGID METAL CONDUIT (RMC)

A. UL 6, ANSI C80.1. Hot dipped galvanized steel conduit after thread cutting.

1. Fittings: NEMA FB2.10.

2.03 POLYVINYL CHLORIDE (PVC) EXTERNALLY COATED GALVANIZED RIGID METAL CONDUIT

A. Description: UL 6, ANSI C80.1, and NEMA RN 1; rigid steel conduit with external PVC coating.

1. PVC Coating: Minimum 40 mils in thickness.

B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.04 ELECTRICAL METALLIC TUBING (EMT)

A. Description: UL 797, ANSI C80.3; steel galvanized tubing.

B. Fittings: NEMA FB 1; steel, compression type.

2.05 FLEXIBLE METAL CONDUIT (FMC)

A. Description: UL 1, interlocked steel construction.

B. Fittings: NEMA FB 2.20.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: UL 360, inner core made from spiral wound strip of heavy gauge, hot dipped galvanized low carbon steel. 3/4-inch through 1-1/4-inch trade sizes to have a square lock core and contain an integral bonding strip of copper. 1-1/2-inch and larger to have fully interlocked core. Jacket material to be moisture, oil and sunlight resistant flexible PVC.

B. Fittings: NEMA FB 2.20.

2.07 ELECTRICAL POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: UL 651, NEMA TC 2; Schedule 40 PVC.

B. Fittings: NEMA TC 3.

2.08 CONDUIT FITTINGS

A. Bushings:

1. Insulated type for threaded raceway connectors without factory-installed plastic throat conductor protection.
2. Insulated grounding type for threaded raceway connectors.

B. Raceway Connectors and Couplings:

1. Steel connectors, couplings, and conduit bodies, hot-dip galvanized.
2. Connector locknuts to be steel, with threads meeting ASTM tolerances. Locknuts to be hot-dip galvanized.
3. Connector throats (EMT, flexible conduit, metal clad cable and cordset connectors) to have factory installed plastic inserts permanently installed. For normal cable or conductor

exiting angles from raceway, the cable jacket or conductor insulation to bear only on plastic throat insert.

4. Steel gland, Tomic or Breagle connectors and couplings are recognized for this Contract as having acceptable raceway to fitting electrical conductance.
5. Set screw connectors and couplings, without integral compression glands, are recognized for this Contract as not having acceptable raceway to fitting electrical conductance. A ground conductor sized per this Specification must be included and bonded within raceway assembly utilizing this type connector or coupling.

C. Provide expansion/deflection fittings for EMT.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Finished Surfaces: Schedule raceway installation to avoid conflict with installed wall and ceiling surfaces. If unavoidable, coordinate work and repairs with Architect.

B. Conduit Size:

1. Minimum Size: 3/4-inch for power and control, unless otherwise noted. 3/4-inch for communication/data, unless otherwise noted. 3/4-inch for signal systems, unless otherwise noted.

C. Underground Installations:

1. More than 5-feet from Foundation Wall: Use PVC.
2. Within 5-feet from Foundation Wall: Use PVC coated RMC.
3. In or Under Slab on Grade: Use PVC.
4. Minimum Size: 1-inch.

D. In Slab Above Grade:

1. Use PVC.
2. Maximum Size Conduit in Slab: Contact Structural Engineer for maximum outside diameter of conduit.

E. Provide two pull strings/tapes in empty conduits. Types:

1. Feeders: Polyester measure/pulling tape, Greenlee 4436 or approved.
2. Branch Circuits and Low Voltage: Greenlee Poly Line 431 or approved.
3. If fish tape is used for pulling line or low voltage wiring, fiberglass type to be used. Metal fish tapes will not be allowed.
4. Secure pull string/tape at each end.
5. Provide caps on ends of empty conduit to be used in future.
6. Label both ends of empty conduits with location of opposite end.

F. Elbows: Use fiberglass or PVC coated RMC for underground installations.

G. Elbow for Low Energy Signal Systems: Use long radius factory ells where linking sections of raceway for installation of signal cable.

H. Verify that field measurements are as shown on Drawings.

I. Plan locations of conduit runs in advance of the installation and coordinate with ductwork, plumbing, ceiling and wall construction in the same areas.

J. Locate penetrations and holes in advance where they are proposed in the structural sections such as footings, beams, and walls. Penetrations are acceptable only when the following occurs:

1. Where shown on the Structural Drawings.
2. As approved by the Structural Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.

K. Verify routing and termination locations of conduit prior to rough-in.

L. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

M. Install raceways securely, in neat and workmanlike manner, as specified in NECA 1, Standard Practices for Good Workmanship in Electrical Construction.

N. Install steel conduit as specified in NECA 101, Standard for Installing Steel Conduits.

O. Install nonmetallic conduit in accordance with manufacturer's instructions.

P. Inserts, anchors and sleeves.

1. Coordinate location of inserts and anchor bolts for electrical systems prior to concrete pour.
2. Coordinate location of sleeves with consideration for other building systems prior to concrete pour.

Q. Conduit Supports:

1. Arrange supports to prevent misalignment during wiring installation.
2. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
3. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
4. Do not attach conduit to ceiling support wires.

R. Flexible metal conduit length not-to-exceed 6-feet, 3-feet in concealed walls. Provide sufficient slack to reduce the effect of vibration.

S. Install conduit seals at boundaries where ambient temperatures differ by 10 degrees F or more as shown on the drawings. Install seals on warm side of partition.

T. Seal raceways stubbing up into electrical equipment. Plug raceways with conductors with duct-seal. Cap spare raceways and plug PVC raceway products with plastic plugs as made by Underground Products, or equal, shaped to fit snugly into the stubup.

U. Seal raceways penetrating an exterior building wall to prevent moisture and vermin from entering into the electrical equipment.

V. Use suitable caps on spare and empty conduits to protect installed conduit against entrance of dirt and moisture.

W. Keep 277/480 volt wiring independent of 120/208 volt wiring. Keep power wiring independent of communication system wiring.

X. Keep emergency system wiring independent of other wiring systems per NEC 700.

Y. Arrange conduit to maintain headroom and present neat appearance.

Z. Do not install conduits on surface of building exterior, along vapor barrier, across roof, on top of parapet walls, or across floors, unless otherwise noted on drawings.

AA. Exposed conduits are permitted only in following areas:

1. Mechanical rooms, electrical rooms or spaces where walls, ceilings and floors will not be covered with finished material.
2. Existing walls that are concrete or block construction.
3. Where specifically noted on Drawings.
4. Route exposed conduit parallel and perpendicular to walls, tight to finished surfaces and neatly offset into boxes.

BB. Do not install conduits or other electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block area passage's intended usage.

CC. Install continuous conduit and raceways for electrical power wiring and signal systems wiring.

DD. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

EE. Maintain adequate clearance between conduit and piping.

FF. Keep conduits a minimum of 12-inches away from steam or hot water radiant heating lines (at or above 104 degrees F) or 3-inches away from waste or water lines.

GG. Cut conduit square using saw or pipecutter; deburr cut ends.

HH. Bring conduit to shoulder of fittings; fasten securely.

II. Use conduit hubs to fasten conduit to cast boxes in damp and wet locations.

JJ. Install no more than the equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams.

KK. Use hydraulic one shot bender to fabricate elbows for bends in metal conduit larger than 2-inch size.

LL. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

MM. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic joints.

NN. Conduit Terminations for Signal Systems: Provide a plastic bushing on the end of conduit used for signal system wiring.

OO. Feeders: Do not combine or change feeder runs.

PP. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07, Thermal and Moisture Protection.

QQ. Route conduit through roof openings for piping and ductwork wherever possible. Where separate roofing penetration is required, coordinate location and installation method with roofing installation and installer.

3.02 RIGID METAL CONDUIT (RMC) INSTALLATION

A. Outdoor Locations Above Grade: RMC.

B. Damp Locations: RMC.

C. In areas exposed to mechanical damage: RMC.

D. For security conduits installed exposed and subject to tampering: RMC.

3.03 POLYVINYL CHLORIDE (PVC) EXTERNALLY COATED GALVANIZED RIGID METAL CONDUIT INSTALLATION

A. Use PVC coated RMC 36-inch radius ells for power service conduits and 48-inch radius ells for telephone service conduits.

3.04 ELECTRICAL METALLIC TUBING (EMT) INSTALLATION

A. Dry Locations:

1. Concealed: EMT.
2. Exposed: EMT.

B. Dry, Protected: EMT.

3.05 FLEXIBLE METAL CONDUIT (FMC) INSTALLATION

A. Dry Locations: Motors, recessed luminaires and equipment connections subject to movement or vibration, use flexible metallic conduit.

B. Install 12-inch minimum slack loop on flexible metallic conduit.

3.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC) INSTALLATION

A. Use PVC coated liquidtight flexible metallic conduit for motors and equipment connections subject to movement or vibration and subjected to any of following conditions: Exterior location, moist or humid atmosphere, corrosive environments, water spray, oil, or grease.

B. Install 12-inch minimum slack loop on liquidtight flexible metallic conduit.

3.07 ELECTRICAL POLYVINYL CHLORIDE (PVC) CONDUIT INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide equipment grounding conductor in PVC conduit runs containing power conductors.

C. Underground Installation:

1. Areas subject to vehicular traffic: Schedule 80 PVC.
2. Other underground applications: Schedule 40 PVC, except where prohibited by the NEC or local codes.

D. Convert PVC conduit to Rigid Metal Conduit (RMC) prior to emerging from underground, concrete encasement, or concrete slab.

E. Provide expansion fittings to compensate for expansion and contraction per NEC 352.44.

F. PVC elbows are not acceptable. Use fiberglass or PVC coated RMC.

G. Trim cut ends inside and outside to remove rough edges.

H. Provide bushings when entering a box, fitting or other enclosure.

3.08 CONDUIT FITTINGS INSTALLATION

A. Conduit Joints: Assemble conduits continuous and secure to boxes, panels, luminaires and equipment with fittings to maintain continuity. Provide watertight joints where embedded in concrete, below grade or in damp locations. Seal metal conduit with metal thread primer. Rigid conduit connections to be threaded, clean and tight (metal to metal). Threadless connections are not permitted for RMC. Seal conduits where penetrating below raised floor area.

B. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

C. Use set screw type fittings only in dry locations. When set screw fittings are utilized provide insulated continuous equipment ground conductor in conduit, from overcurrent protection device to outlet.

D. Use compression fittings in dry locations, damp and rain-exposed locations. Maximum size permitted in damp locations and locations exposed to rain is 2-inches in diameter.

E. Use threaded type fittings in wet locations, and damp or rain-exposed locations where conduit size is greater than 2-inches.

F. Use PVC coated, threaded type fittings in corrosive environments.

G. Use insulated type bushings with ground provision at switchboards, panelboards, safety disconnect switches, junction boxes that have feeders 60 amperes and greater.

H. Condulets and Conduit Bodies:

1. Do not use condulets and conduit bodies in conduits in feeders 100 amp and larger.

I. Sleeves and Chases – Floor, Ceiling and Wall Penetrations: Provide necessary rigid conduit sleeves, openings and chases where conduits or cables are required to pass through floors, ceilings or walls.

J. Expansion Joints:

1. Provide conduits crossing expansion joints where cast in concrete with expansion-deflection fittings, installed per manufacturer's recommendations.
2. Secure conduits 3-inches and larger to building structure on opposite sides of a building expansion joint with an expansion-deflection fitting across joint installed per manufacturer's recommendations.
3. Provide conduits less than 3-inches where not cast in concrete with junction boxes securely fastened on both sides of expansion joint, connected together with 15-inches of slack (minimum of 15-inches longer than straight line length) flexible conduit and copper green ground bonding jumper. In lieu of this flexible conduit, an expansion-deflection fitting, as indicated for conduits 3-inch and larger may be installed.
4. Verify expansion/deflection requirements with Structural Engineer prior to installation.

K. Seismic Joints:

1. No conduits cast in concrete allowed to cross seismic joint.
2. Provide conduits with junction boxes securely fastened on both sides of seismic joint, connected together with 15-inches of slack (minimum of 15-inches longer than straight line length) flexible conduit and copper green ground bonding jumper. Prior to installation, verify with Architect that 15-inches is adequate for designed movement, and if not, increase this length as required.
3. Provide conduits less than 3-inches where not cast in concrete with junction boxes securely fastened on both sides of expansion joint, connected together with 15-inches of slack (minimum of 15-inches longer than straight line length) flexible conduit and copper green ground bonding jumper. In lieu of this flexible conduit, an expansion-deflection fitting, as indicated for conduits 3-inches and larger may be installed.

L. Provide rigid conduit coupling flush with surface of slab or wall for conduit stubbed in concrete slab or wall to serve electrical equipment or an outlet under table or to supply shop tool, etc. Provide plug where conduit is to be used in future.

END OF SECTION

SECTION 260534 – BOXES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Outlet Boxes
2. Pull and Junction Boxes
3. Box Extension Adapter
4. Weatherproof Outlet Boxes

B. Provide electrical boxes and fittings for a complete installation. Include but not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts and other necessary components.

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Section 26 05 33, Raceways
2. Section 26 05 53, Identification for Electrical Systems

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Outlet Boxes:

1. Hubbell
2. Thomas & Betts
3. Eaton/Crouse-Hinds
4. Or approved equivalent.

B. Pull and Junction Boxes:

1. Eaton/Crouse-Hinds
2. Hoffman
3. Or approved equivalent.

C. Box Extension Adapter:

1. Hubbell
2. Thomas & Betts
3. Eaton/Crouse-Hinds
4. Or approved equivalent.

D. Weatherproof Outlet Boxes:

1. Legrand (Pass & Seymour)
2. Hubbell
3. Thomas & Betts
4. Eaton/Crouse-Hinds
5. Intermatic
6. Or approved equivalent.

2.02 OUTLET BOXES

A. Luminaire Outlet: 4-inch octagonal box, 1-1/2-inches deep with 3/8-inch luminaire stud if required. Provide raised covers on bracket outlets and on ceiling outlets.

B. Device Outlet: Installation of one or two devices at common location, minimum 4-inches square, minimum 1-1/2-inches deep for non-USB type devices. Installation of one or two devices at common locations, minimum 4-inches square, minimum 2-inches deep for USB type devices. Single- or two-gang flush device raised covers.

C. Telecom Outlet: Provide 4-inches square, minimum 2-1/8-inch deep box with two-gang plaster ring.

D. Multiple Devices: Three or more devices at common location. Install one-piece gang boxes with one-piece device cover. Install one device per gang.

E. Masonry Boxes: Outlets in concrete.

F. Construction: For interior locations, provide galvanized steel outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. All surface mounted outlet boxes are to be drawn. Welded boxes are not acceptable.

G. Accessories: Provide outlet box accessories for each installation, including mounting brackets, wallboard hangers, extension rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

H. Noise Control: Provide acoustic putty pad to back side of each outlet box installed in acoustic rated walls.

2.03 PULL AND JUNCTION BOXES

A. Construction: Provide ANSI 61 gray polyester powder painted sheet steel junction and pull boxes, with screw-on covers; of type shape and size, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

B. Location:

1. Provide junction boxes above accessible ceilings for drops into walls for receptacle outlets from overhead.
2. Provide junction boxes and pull boxes to facilitate installation of conductors and limiting accumulated angular sum of bends between boxes, cabinets and appliances to 270 degrees.

C. In-Ground Cast Metal Box: NEMA 250, Type 6, outside flanged, recessed cover box for flush mounting:

1. Construction: Cast aluminum.
2. Cover: Smooth cover with neoprene gasket and stainless steel cover screws.
3. Cover Legend: ELECTRIC.

D. Fiberglass Handholes: Die molded glass fiber hand holes:

1. Cable Entrance: Pre-cut 6- x 6-inch cable entrance at center bottom of each side.
2. Cover: Fiberglass weatherproof cover with nonskid finish.
3. Cover Legend: ELECTRIC.

2.04 BOX EXTENSION ADAPTER

A. Construction: Diecast aluminum.

B. Location: Install over flush wall outlet boxes to permit flexible raceway extension from flush outlet to fixed or movable equipment.

2.05 WEATHERPROOF OUTLET BOXES

A. Construction: Provide corrosion-resistant cast metal weatherproof outlet wiring boxes, of the type, shape and size, including depth of box, with threaded conduit ends, cast metal faceplate with spring-hinged waterproof cap suitably configured for each application, including faceplate, gasket, blank plugs and corrosion proof fasteners. Weatherproof boxes to be constructed to have smooth sides, gray finish.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate locations of floor boxes and wall mounted wiring device boxes with architectural and structural floor plans prior to rough-in.

B. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1, Standard Practice of Good Workmanship in Electrical Construction.

C. Secure boxes rigidly to substrate upon which they are being mounted.

D. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NEC. Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.

E. Set wall mounted boxes at elevations to accommodate mounting heights specified in this Section.

F. Electrical boxes are shown on drawings in approximate locations unless dimensioned.

1. Adjust box locations up to 10-feet if required to accommodate intended purpose.

G. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07, Thermal and Moisture Protection.

H. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

I. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

J. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12-inches of box.

K. Box Color Coding and Marking: Reference Section 26 05 53, Identification for Electrical Systems.

L. Adjust boxes to be parallel with building lines. Boxes not plumb to building lines are not acceptable.

M. Install knockout closures in unused box openings.

N. Clean interior of boxes to remove dust, debris, and other material.

O. Clean exposed surfaces and restore finish.

3.02 OUTLET BOXES INSTALLATION

A. Mount outlet boxes, unless otherwise required by ADA, or noted on drawings, following distances above finished floor:

1. Control Switches:

    a. 48-inches to the top of outlet box.
    b. 4-inches above top of backsplash at countertops/workstations, not-to-exceed 44-inches above finished floor to the top of outlet box per ADA requirements.

2. Receptacles: 15-inches to the bottom of outlet box.
3. Telecom Outlets: 15-inches to the bottom of outlet box.
4. Other Outlets: As indicated in other sections of specifications or as detailed on drawings.

B. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6-inches from ceiling access panel or from removable recessed luminaire.

C. Flush Outlets in Insulated Spaces: Maintain integrity of insulation and vapor barrier.

D. Coordinate electrical device locations and elevations (switches and receptacles) with architectural drawings to prevent mounting devices in mirrors, back splashes, and behind cabinets.

E. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

F. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices. Adjacent boxes not aligned vertically to be adjusted at no additional cost to Owner.

G. Use flush mounting outlet box in finished areas.

H. Do not install flush mounting box back-to-back in walls; provide minimum 6-inches separation. Provide minimum 24-inches in acoustic rated walls.

I. In acoustical walls, apply acoustic putty pad on outlet box prior to installation of acoustical blanket.

J. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

K. Use stamped steel bridges to fasten flush mounting outlet box between studs.

L. Use adjustable steel channel fasteners for hung ceiling outlet box.

M. Use gang box where more than one device is mounted together. Do not use sectional box.

N. Use gang box with plaster ring for single device outlets.

O. Adjust flush-mounting outlets to make front flush with finished wall material.

3.03 PULL AND JUNCTION BOXES INSTALLATION

A. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

B. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6-inches from ceiling access panel or from removable recessed luminaire.

C. Do not fasten boxes to ceiling support wires.

D. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

3.04 BOX EXTENSION ADAPTER INSTALLATION

A. Match material to box.

B. Install gaskets at exterior and wet locations.

3.05 WEATHERPROOF OUTLET BOXES INSTALLATION

A. Use cast outlet box in exterior locations exposed to weather and wet locations.

B. Install gaskets.

END OF SECTION

SECTION 260543 – ELECTRICAL VAULTS AND UNDERGROUND RACEWAYS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Vaults
2. Precast Vault Concrete Materials
3. Vault Components
4. Handholes
5. Raceways

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Section 26 05 33, Raceways

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. NEMA TC 2 – Electrical Polyvinyl Chloride (PVC) Tubing and Conduit (EPC-40 and EPC-80).
2. NEMA TC 3 – Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
3. NEMA TC 6/8 – Extra-Strength PVC Plastic Utilities Duct for Underground Installation.
4. NEMA TC 9 – Fittings for Extra-Strength Plastic Utilities Duct for Underground Installation.
5. NEMA TC 14 – Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
6. UL 1684 – Standard for Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Shop drawings detailing items provided under this Section:

    a. Vault cover assigned designators.
    b. Duct entry schedule.
    c. Pulling iron working load.
    d. ASTM load designation and percentage increase in live load for impact.
    e. Vault section weights.
    f. Rebar and piling support details.
    g. Indicate dimensions, reinforcement, size and locations of openings, and accessory locations for precast manholes and handholes.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Installer will have documented experience in the placement of vaults for a minimum of three years.
2. Manufacturer will have documented experience in the manufacture of vaults for minimum of three years.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Vaults:

1. Oldcastle Precast
2. Or approved equivalent.

B. Precast Vault Concrete Materials:

1. Oldcastle Precast
2. Jensen Precast
3. Or approved equivalent.

C. Vault Components:

1. Pull-In/Lift Irons:

    a. Oldcastle Precast

b. Jensen Precast
c. Hubbell
d. Inwesco
e. Or approved equivalent.

2. Vault Cable Rack Hardware:

a. Oldcastle Precast
b. Jensen Precast
c. Hubbell/Chance
d. Or approved equivalent.

3. Grade Rings:

a. Oldcastle Precast
b. Jensen Precast
c. Neenah Foundry
d. Or approved equivalent.

D. Handholes:

1. Oldcastle Precast
2. Jensen Precast
3. Hubbell/Quazite
4. Or approved equivalent.

E. Raceways:

1. See Section 26 05 33, Raceways.
2. Fiberglass (RTRC):

a. FRE Composites Corp.
b. Champion Fiberglass
c. United Fiberglass of America

2.02 VAULTS

A. Precast, reinforced concrete sections (top, base) with knockouts or duct terminators PVC end bells on each wall for main conduit entrances with recessed keyways and subsidiary duct entrances.

B. Concrete inserts or 'C' channels set in interior surfaces of walls of each section to provide for cable rack mounting.

C. Base section equipped with pull-in/lift irons (one each corner).

2.03 PRECAST VAULT CONCRETE MATERIALS

A. Concrete:

1. Conform to ASTM C478.
2. Compressive Strength: 5000-PSI minimum at 28 days.
3. Air Content: 4 percent minimum.
4. Cementitious Materials: Minimum of 564-lbs/cu yd.
5. Course Aggregates: ASTM C33. Sound, crushed, angular granite stone only. Smooth or rounded stone will not be used.
6. Fine Aggregates: ASTM C33. Free from organic impurities.
7. Chemical Admixtures: ASTM C494. Calcium chloride or admixtures containing calcium chloride will not be used.
8. Air Entraining Admixtures: ASTM C260.

B. Reinforcing Steel: ASTM A615 grade 60 deformed bar.

C. Lift Loops:

1. ASTM A416 steel strand.
2. Lifting loops made from deformed bars are not allowed.

D. Flexible Joint Sealants:

1. Butyl rubber based conforming to Federal Specification SS-S-210A, AASHTO-198, Type B-Butyl Rubber and maximum of 1 percent volatile matter.
2. Suitable for application temperatures between 10 and 100 degrees F.

E. Epoxy Gels:

1. Two-component, solvent-free, moisture-insensitive, high modulus, high strength, structural epoxy paste adhesive.
2. Meet requirements of ASTM C-881, Type I and II, Grade 3, Class B and C, epoxy resin adhesive.

2.04 VAULT COMPONENTS

A. Lifting Inserts, Holes and Devices: Comply with OSHA Standard 1926.704. Size lift holes and inserts for precision fit with lift devices and not penetrating through structure wall. Precast manufacturer will provide lifting devices.

B. Internally seal joints between tongue and groove; additionally, seal around external perimeter of the joint as follows:

1. External Seals: Polyethylene backed flat butyl rubber sheet no less than 1/16-inch thick and 6-inches wide applied to outside perimeter of joint.
2. Internal Seals: Plastic or paper-backed butyl rubber rope no less than 14 feet long and having cross-sectional area no less than annular space times height of joint.
3. Contractor Option: Internal seals on round joints may consist of O-ring gasket conforming to ASTM C443, installed according to precast manufacturer's recommendation.

C. Top Section: Include grooved opening for frame and cover.

D. Frames and Doors: Spring assisted, galvanized, diamond plate door with hex-head locking latch.

E. Precast Base Sections: Cast monolithically without construction joints or with approved galvanized or PVC water stop cast in the cold joint between base slab and walls. Include a round sump with cast sleeve sized by the vault manufacturer, and two 1-inch ground rod openings.

F. Wall and inside slab finish resulting from casting against forms standard for industry will be acceptable. Form ties through the wall are not allowed. Float finish for exterior slab surfaces below grade. Small surface holes, normal color variations, normal form joint marks and minor depressions, chips and spalls will be tolerated. Dimensional tolerances will be as set forth in above references.

G. Conduit entry size and locations as indicated on Drawings. Conduit openings not to extend into corners of structures, but may extend across joint with Engineer's approval.

H. Knockout panel dimensions as required by structural design at their maximum burial depth using design loads specified below.

I. Design components in accordance with ACI, ASTM C890 and the following loads:

1. Horizontal Load on Walls and Knockout Panels: 80 psf per foot of burial depth (using a burial depth of 20-feet) plus a live lateral surcharge due to HS20 traffic load of 80 psf.
2. Vertical Load on Below Grade Adaptor Slabs and Tops: Fill height of 20-feet assuming soil unit weight of 100 lbs/ft, plus live HS20 traffic load.
3. Vertical Load on Covers Supported Around Perimeter: Live HS20 traffic load.

J. Provide cable racks, mounting channels and inserts as indicated on Drawings. Cable Rack Inserts: Minimum load rating of 800 pounds.

K. Cable Supports: Maple clamps and saddles.

L. Sump Cover: ASTM A48; Class 30B gray cast iron.

M. Rectangular sub-grade components to be designed and manufactured in conformance with ASTM C913 and as follows:

1. Joints Between Precast Components: Keyways or tongue and groove. Joints to Accept Cast Iron Frames: Flat and no less than 5-inches wide.
2. Construct access vault structures to sizes and elevations shown on Drawings.
3. Manholes and Hardware:

    a. Provide each manhole with one galvanized 3/4-inch rebar by 16-inches wide bolt-on ladder, mounting pads and mounting hardware. Rungs at 12-inches centers. Side Rails: 2-inches by 5/16-inches flat bar.
    b. Supply each manhole entrance with one galvanized 3/4-inch by 16-inches wide bolt-on manhole step.

N. Pull-In Irons:

1. 7/8-inch hot-dipped galvanized pull-in irons located opposite each new and future main cable entrance.

O. Vault Cable Rack Hardware:

1. Cable Rack: Chance #1225
2. Cable Rack Hooks: Chance #1231
3. Cable Rack Insulators: Chance #1121

P. Grade Rings:

1. Rings, Covers and Frames: Class 35 gray iron. Covers and Frames: Equal to Neenah Foundry #R-1530 manhole frame Type B non-rocking lid. As required to meet grading level.

2.05 HANDHOLES

A. Housing: Polyester pre-mix with calcium carbonate and polyester resins interlaced with fiber fiberglass and ultraviolet inhibitors.

B. Extension Rings: Capable of accepting up to 18-inches of extension rings to adapt to re-leveling of grade during construction.

C. Lid: Polyester pre-mix with calcium carbonate and polyester resins interlaced with fiber fiberglass and ultraviolet inhibitors, with nonskid finish, neoprene gaskets and stainless steel screws. Same size as opening of housing for as much hand space as possible for wire access.

D. Lid Legend: ELECTRICAL.

E. Cable Entrance: Pre-cut 6 x 6-inch cable entrance at center bottom of each side.

2.06 RACEWAYS

A. See Section 26 05 33, Raceways.

B. PVC Conduit: NEMA TC 2. Fittings and Conduit Bodies: NEMA TC 3.

1. Schedule 40 for normal/utility feeds.
2. Schedule 80 for emergency feeds.

C. Plastic Utilities Duct: NEMA TC 6/8; PVC Type DB.

D. Plastic Utility Duct Fittings: NEMA TC 9.

E. Fiberglass Conduit (RTRC), Elbows and Fittings: NEMA TC 14 and UL 1684.

1. Conduit and Fittings: 0.095 inches wall thickness.
2. Large Sweep Elbows: 1.110 inches wall thickness.

3. Joining Method: Supply each length of conduit with a tapered spigot and an integral bell with an integral urethane Tri-Seal gasket held in place with a retaining ring. Minimum 400 pound for the Tri-Seal joint.
4. Adapters: Provide appropriate UL Listed adapters for transitions to and from PVC and steel conduit.
5. Provide conduit in 20 foot lengths, free of burrs and ridges.
6. Fabricate sweeps in one piece, without couplings, joints or tangent lengths, other than at ends.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Install per manufacturer's instructions and recommendations.

B. Plan locations of duct runs in advance of the installation. Coordinate with site utility systems and building foundation depths.

C. Duct bank routing is shown on Drawings in approximate locations unless dimensions are indicated. Verify routing and termination locations of duct bank prior to excavation for rough-in. Route as required to complete duct system.

D. Manhole and vault locations are shown on Drawings in approximate locations unless dimensions are indicated. Verify locations of manholes and vaults prior to excavating for installation. Locate as required to complete duct bank system.

E. Requirements for Precast Concrete Vaults: Coordinate delivery of precast concrete manhole components to jobsite with manufacturer. Handle materials in accordance with ASTM C891 and manufacturer's recommendations. Handle and store components on job site using methods that prevent damage.

F. Cleaning Vaults: Clean and leave free of debris, silt and rocks from installation work.

3.02 VAULTS

A. Excavate to required depth and remove materials that are unstable or unsuitable for good foundation. Prepare level, compacted foundation extending 6-inches beyond base. Some manholes/vaults may be piling supported.

B. Set base plumb and level.

C. Provide minimum 18-inches of pea gravel below manhole/vault for stability and drainage.

D. Thoroughly clean bells and spigots to remove dirt and other foreign materials that may prevent sealing. Unroll butyl sealant rope directly against spigot or keyway. Leave protective wrapper attached until sealant is entirely unrolled. Do not stretch. Overlap from side to side, not top to bottom.

E. When recommended by manufacturer, fill void between horizontal joint surfaces with sand cement grout around the outside perimeter.

F. After joining sections, apply butyl sealant sheet around outside perimeter of joint.

G. Plug lift holes leaving less than 2-inches of wall thickness from outside using sand cement mortar, then cover with butyl rubber sheet. Additionally seal lift holes penetrating wall with epoxy gel on interior.

H. Set frames or tops to required elevation sealing joints with butyl sealant rope and sheet.

I. Use precast neck and shaft sections to bring manhole/vault cover to finished elevation.

J. Provide cable racks in each manhole/vault for support of conductors. Attach cable racks to inserts after manhole/vault installation is complete.

K. Install drains in manholes/vaults as indicated on drawings and as required.

L. Provide 3/4-inch by 10-foot copper ground rod at each manhole/vault.

M. Dampproof exterior surfaces, joints, and interruptions of manholes/vaults after concrete has cured 28 days.

3.03 HANDHOLES

A. Excavate to required depth and remove materials that are unstable or unsuitable for good foundation. Prepare level, compacted foundation extending 6-inches beyond base. Some vaults may be piling supported. Check structural drawings and details.

B. Set base plumb and level. Set handhole such that cover surface matches finished grade.

C. Provide minimum 12-inches of pea gravel below handhole for stability and drainage.

D. Turn conduits up into handhold with required bend radius per guidance in Section 26 05 33, Raceways.

E. Engrave cover of handhole to identify its purpose (examples: “Power," “Emergency Power,” “Signal,” “Fire Alarm”).

3.04 RACEWAYS

A. Power and System Duct Bank Raceways: PVC, Fiberglass (RTRC) or PVC coated Rigid Metal Conduit.

B. Elbows for Power and System Raceways: Fiberglass (RTRC) elbows or PVC coated Rigid Metal Conduit elbows.

C. Provide all excavation and backfill required to support Division 01 and this Division of work. Coordinate trench specs for concrete, soil or sand backfill.

D. Excavate trenches six inches deeper and wider than ductbank burial and cross-sectional requirements. Remove from the site all excavated materials not suitable or specified for backfill.

E. Backfill trenches with sand, tamped firm and even to trench depth level.

F. Backfill with non-expansive soil with limited porosity. Deposit all backfill soil in 6-inch layers. Thoroughly and carefully tamp all backfill soils to 90-95 percent compaction until the ductbank is covered by no less than 12-inches of material. Backfill and tamp the remainder of the excavation at 12-inch intervals. Uniformly grade the finished surface.

G. Provide sheeting, shoring, dewatering and cleaning required to keep the trenches and their grades in proper condition for the work to be carried on.

H. Restore all landscape and paving to like new to match existing.

I. Slope raceways away from buildings and drain towards manholes or vaults with a minimum slope of 3 percent. Drain raceways into manholes or vaults, not into building structures or panels. Where sloping cannot be fully provided and there is a section of raceway where water would flow to a panel, switchboard, transformer, or building, provide a means to discharge the excess water from the raceway, or raceway system, consisting of a box or fitting at a low point prior to equipment entry, or at building entry, with a fitting or plug that can be removed to allow drainage.

J. Cut raceway square using saw or pipe cutter; de-burr cut ends.

K. Insert raceway to shoulder of fittings; fasten securely.

L. Join PVC raceway using adhesive as recommended by manufacturer.

M. Wipe PVC raceway dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

N. Number of equivalent 90-degree bends permitted between pull points: Maximum of three bends for power system conduit banks.

O. Provide suitable fittings to accommodate expansion and deflection where required.

P. Terminate raceway at manhole entries using end bells.

Q. Use suitable separators and chairs installed not greater than 5 feet on centers.

R. Provide 1/4-inch polypropylene pull rope in each empty raceway except sleeves and nipples.

S. Swab raceway. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

T. Interface installation of underground warning tape with backfilling. Install tape 6-inches below finished surface.

END OF SECTION

SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Equipment Nameplates
2. Device Labels
3. Wire Markers

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals not required for this Section.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Manufacturer's Qualifications: Firms regularly engaged in manufacture of identification devices of types and sizes required.
2. Manufacturer's standard products of categories and types required for each application as referenced in other Division 26, Electrical Sections. Where more than a single type is specified for application, provide single selection for each product category.
3. Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices unless otherwise indicated.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Equipment Nameplates:

1. B & I Nameplates
2. Intellicum
3. JBR Associates
4. Or approved equivalent.

B. Device Labels:

1. Kroy
2. Brady
3. Or approved equivalent.

C. Wire Markers:

1. Brady
2. Panduit
3. Sumitomo
4. Or approved equivalent.

2.02 EQUIPMENT NAMEPLATES

A. Engraved phenolic plastic, laminate, minimum 1/16-inch thick in the size indicated, with beveled edge border matching letter color. Federal specification LP-387A. All upper case letters in engraver standard letter style of the size and wording indicated. Provide with 2-mil adhesive backing. Embossed tape style labels are not acceptable.

B. Color:

1. Normal (Utility): White letters on black background.
2. Life Safety/Critical (Emergency Systems): Black letters on orange background.
3. Equipment Branch (Legally Required Standby Systems): Black letters on yellow background.

C. Letter Size:

1. Use 1/2-inch letters minimum for identifying major equipment and loads, including switchgear, switchboards, distribution panels, generators, automatic transfer switches, UPS, etc.

2. Use 1/4-inch letters minimum for identifying panels, breakers, transformers, VFDs, disconnects, etc.
3. Use 3/16-inch minimum for identifying source, voltage, current, phase, wire configurations, and short circuit current rating (SCCR).

D. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

E. The Architect, Engineer, Commissioning Agent and Owner reserve the right to make modifications to the nameplates as necessary.

F. Locations:

1. Switchgear, switchboards, sub-distribution switchboards, distribution panels, branch panels, automatic transfer switches, UPS.
2. Main breakers and distribution breakers in switchgear, switchboards, and distribution panels.
3. Equipment including, but not limited to, motor controllers, disconnects, and VFDs.
4. Distribution transformers.

2.03 DEVICE LABELS

A. Extra strength, laminated adhesive tape with 3/16-inch black letters on clear background. Embossed tape/punch tape style labels are not acceptable.

B. Receptacles: Indicate source panel and source circuits (e.g. xxx-xx).

C. Wall Switches/Control Device Stations:

1. Where controls are provided for remote lighting or power outlets, or where controls in same location serve different purposes or areas, such as corridor and outside, provide device label indicating function of each control device.
2. Label the function of control devices where two or more are mounted in same location and control function may be unclear.
3. Wall switches with engraved buttons do not require labeling.

D. Junction Boxes: Label to show system identification, source circuit, or raceway origin. In finished areas, utilize device label. In unfinished areas or above ceilings, use of permanent ink marker is acceptable.

E. Panel and circuit designation written in permanent marker on the back of the plate and inside all back-boxes and junction boxes.

2.04 WIRE MARKERS

A. Description: Vinyl-cloth self-adhesive type wire markers.

B. Locations: Each conductor at panelboard gutters and each load connection.

C. Power and Lighting Circuits: Branch circuit or feeder number as indicated on drawings and source panel.

2.05 UNDERGROUND WARNING TAPE

A. Description: 6-inch wide inert polyethylene plastic tape, 4-mil thick, detectable type, colored per APWA recommendations unless otherwise noted with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate designations used on Drawings with equipment nameplates and device labels.

B. Install nameplates and labels parallel to equipment lines.

C. Identify empty conduit and boxes with intended use.

D. Provide typewritten branch panel schedules with protective clear transparent covers accounting for every breaker installed. Use actual room designations assigned by name or number near completion of the work, and not the designations shown on drawings.

E. Provide color coded boxes as follows:

1. Fire Alarm: Red.

3.02 EQUIPMENT NAMEPLATES

A. Degrease and clean surfaces to receive nameplates.

B. Secure equipment nameplates to equipment front using self-tapping stainless steel screws.

C. Secure equipment nameplates to inside surface of door on panelboard that is recessed in finished locations.

D. Verify emergency system distribution equipment nameplate colors with Architect/Owner.

E. Switchgear, switchboards, sub-distribution switchboards, distribution panels and branch panels to include name, source, voltage, current, phase, wire configuration, and short circuit current rating (SCCR). Transformers to include source, KVA, and secondary voltage, phase, and wire configuration.

F. Provide nameplates for flush mounted branch panelboards identifying name on front door. On inside of door provide nameplate as noted above. Verify with Architect/Owner if nameplate on outside of door is required.

G. Provide a second label at branch panelboards listing the means of identification of branch circuit conductors. This identification legend to consist of the color code used for each voltage system (208Y/120V and 480Y/277V). Include identification of both voltage systems on each label, regardless of the voltage of the panelboard to which the label is affixed. Comply with requirements of NEC 210.5.

1. See Specification Section 26 05 19, Low-Voltage Electrical Power Conductors and Cables, for required conductor color code for this project.

3.03 DEVICE LABELS

A. Reference 3.01, General Installation Requirements.

B. Install per manufacturer's instructions and recommendations.

C. Degrease and clean surfaces to receive labels. Fingers to be regularly cleaned of grease and debris to prevent fingerprints on labels. Labels installed dirty or with fingerprints to be replaced at no cost to Owner.

3.04 WIRE MARKERS

A. Reference 3.01, General Installation Requirements.

B. Install per manufacturer's instructions and recommendations.

C. Provide wire markers on each conductor for power, control, signalling and communications circuits.

END OF SECTION

SECTION 260573 – ELECTRICAL DISTRIBUTION SYSTEM STUDIES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Protective Devices
2. Short Circuit Study
3. Arc Flash Labels

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Section 26 24 16, Panelboards

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. IEEE 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
2. IEEE 399, Recommended Practice for Industrial and Commercial Power Systems Analysis.
3. IEEE 1584, Guide for Performing Arc Flash Calculation.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition provide:

1. Power system studies required under this Section with submittals for electrical equipment, including overcurrent protective devices.
2. Electrical equipment ordered prior to submittal of power system studies are not compliant with these specifications, and are subject to removal and replacement at no cost to Owner where not in compliance with Code and Contract Documents for selective coordination.

a. Provide written verification with Stamp or Seal and signature of preparing Engineer.

3. Provide samples of NFPA 70E compliant arc flash hazard labeling for electrical equipment.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Study Preparer Qualifications: Qualified engineer of switchgear manufacturer or approved professional engineer.

a. Experienced in preparation of studies of similar type and magnitude.
b. Familiar with software analysis products specified.

2. Computer Software for Study Preparation: Use latest edition of commercially available software utilizing specified methodologies.

a. Acceptable Software Products:

1) EasyPower
2) Operation Technology, Inc; ETAP.
3) SKM Systems Analysis, Inc; Power Tools for Windows.

b. The above manufacturers are known to be acceptable for study purposes. At the completion of the study, provide an electronic EasyPower file of the project to the Owner/Engineer. The file is to include all files required to edit and evaluate the electronic model, including libraries, one-lines, scenarios, TCC curves and all reports.

3. Contractor Responsibility: Provide project-related data needed by study preparer, including equipment, wire sizes, insulation types, conduit types, actual circuit lengths and available fault currents from utility. Provide information in a timely matter to allow studies to be completed prior to release of equipment.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 GENERAL

A. Analyze specific electrical and utilization equipment (according to NEC definition), actual protective devices to be used, and actual feeder lengths to be installed.

1. Scope of Studies: New distribution wiring and equipment, from primary source to buses, branch circuit panelboards and equipment rated 50A or larger at utilization voltage.
2. Primary Source, for Purposes of Studies: Utility company transformer secondary.
3. Study Methodology: Comply with requirements and recommendations of NFPA 70, IEEE 399, and IEEE 242.
4. Report: State methodology and rationale employed in making each type of calculation; identify computer software package(s) used.

B. One-Line Diagrams: Prepare schematic drawing of electrical distribution system, with electrical equipment and wiring to be protected by protective devices; identify nodes on diagrams for reference on report that includes:

1. Calculated fault impedance, X/R ratios, utility contribution, and short circuit values (asymmetric and symmetric) at main switchboard bus and downstream devices containing protective devices.
2. Breaker and fuse ratings.
3. Generator kW and voltage ratings, percent impedance, X/R ratios, and wiring connections.
4. Transformer kVA and voltage ratings, percent impedance, X/R ratios, and wiring connections.
5. Identification of each bus, with voltage.
6. Conduit materials, feeder sizes, actual lengths, and X/R ratios.

2.02 PROTECTIVE DEVICES

A. Provide protective devices of ratings and settings as required so that protective device closest to fault will open first.

B. Replace existing protective devices to achieve specified performance.

C. Analyze and determine ratings and settings of protective devices to minimize damage caused by fault and so that protective device closest to fault will open first.

1. Required Ratings and Settings: Derive required ratings and settings of protective devices in consideration of upstream protective device settings and optimize system to ensure selective coordination.
2. Motors with Solid-State Protective Modules: Select settings for best possible motor protection, taking into consideration actual installed motor torque and current and thermal characteristics.
3. Identify any equipment that is underrated.
4. Identify specified protective devices that will not achieve required protection or coordination but with minor changes can be made to do so; provide such modified

devices at no additional cost to Owner and identify them on submittals as "revised in accordance with Protective Device Coordination Study"; minor changes include different trip sizes in same frame, time curve characteristics of induction relays, CT ranges, etc.

5. Identify specified protective devices that will not achieve required protection or coordination and cannot be field adjusted to do so, and for which adequate devices would involve change to contract sum.
6. In all cases where adequate protection or coordination cannot be achieved at no extra cost to Owner, provide a discussion of alternatives and logical compromises for best achievable coordination.
7. Do not order, furnish, or install protective devices that do not meet performance requirements unless specifically approved by Engineer.

D. Protective Device Rating and Setting Chart: Summarize in tabular format required characteristics for each protective device based on analysis; include:

1. Device identification.
2. Relay CT ratios, tap, time dial, and instantaneous pickup.
3. Circuit breaker sensor rating, long-time, short-time, and instantaneous settings, and time bands.
4. Fuse rating and type.
5. Ground fault pickup and time delay.
6. Input level and expected response time at two test points that are compatible with commonly available test equipment and ratings of protective device.
7. Highlight devices that as furnished by Contractor will not achieve required protection.

E. Specified equipment has been designed and selected to achieve specified performance; ensure that equipment actually installed provides that performance.

F. In addition to requirements specified elsewhere, provide overcurrent protective devices having ratings and settings in accordance with results of system studies.

2.03 SHORT CIRCUIT STUDY

A. Calculate fault impedance to determine available 3-phase short circuit and ground fault currents at each bus and piece of equipment during normal conditions, alternate operations, emergency power conditions, and other operations that could result in maximum fault conditions.

1. Show fault currents available at key points in system down to fault current of 1,000 A at 480 V and 208 V.
2. Include motor contributions in determining momentary and interrupting ratings of protective devices.
3. Primary Fault Level Assumptions: Obtain data from utility company.

2.04 ARC FLASH LABELS

A. Provide label compliant with NFPA 70E guidelines indicating personal protective equipment (PPE) recommended for servicing of electrical equipment while energized, as well as calculated incident energy levels and arc flash protective boundary distance.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL

A. Provide services of qualified field engineer and necessary tools and equipment to test, calibrate, and adjust installed protective devices to conform to requirements determined by coordination analysis.

B. Adjust installed protective devices having adjustable settings to conform to requirements determined by coordination analysis.

C. Submit report showing final adjusted settings of protective devices.

3.02 ELECTRICAL POWER SYSTEM STUDIES

A. Short Circuit Analysis Study:

1. Provide complete short circuit study, equipment interrupting and withstand evaluation. Study to include complete electrical distribution system, including contributions from normal source of power without alternative sources of power. Include complete low voltage distribution systems as specified in this Section.
2. Study Basis: thoroughly cover normal and alternative operation modes that can produce maximum fault conditions, including simultaneous motor contributions.
3. Perform study in accordance with applicable ANSI/IEEE Standards.
4. Study Input Data: Utility company short circuit single and three phase contribution, and X/R ratio; resistance and reactance components of each feeder, busway and branch impedance; motor and generator contributions; applicable circuit parameters and contribute to short circuit duty.
5. Calculate short circuit momentary duties and interrupting duties on basis of maximum available fault current at each switchgear bus, switchboard, motor control center, panelboard, transfer switch, busway plug, dry-type transformer primary and secondary and other significant locations throughout system affected by available fault current (including large equipment, disconnects, control panels, uninterruptible power supplies, etc.).
6. Perform equipment evaluation study to determine adequacy of overcurrent protection devices by tabulating and comparing short circuit ratings of these devices with available fault current. Notify Owner in writing where problem areas or inadequacies appear in electrical equipment.
7. Study Report: In bound final report, include sheets listing tabulated information from study, including feeder impedances, motor, utility and generator impedances and fault contributions, and resulting short circuit current including asymmetrical, symmetrical, three, five and eight cycle fault current levels, and line-to-neutral and three-phase-bolted-fault current levels at each calculated point in electrical distribution system.

END OF SECTION

SECTION 260900 – CONTACTORS AND CONTROL DEVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Contactors
2. Electronic Time Switches
3. Photoelectric Switches
4. Emergency Lighting Relays

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. UL 924: Standard for Safety of Emergency Lighting and Power Equipment.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Shop Drawings: Submit to NEMA ICS 1 indicating control panel layouts, wiring connections and diagrams, dimensions, support points.
2. Product Data: Provide for each component showing electrical characteristics and connection requirements.
3. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements apply to this Section.

1.06 WARRANTY

A. Warranty of materials and workmanship as outlined in Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Contactors:

1. Asco
2. Eaton Electrical
3. ABB/General Electric
4. Schneider Electric/Square D
5. Siemens
6. Or approved equivalent.

B. Electronic Time Switches:

1. Intermatic
2. Paragon
3. Sangamo
4. Tork
5. Or approved equivalent.

C. Photoelectric Switches:

1. Precision
2. Paragon
3. Tork
4. Or approved equivalent.

D. Emergency Lighting Relay:

1. Nine 24
2. Bodine
3. Wattstopper
4. Or approved equivalent.

2.02 CONTACTORS

A. Lighting:

1. Continuously rated 20 amp per pole for types of ballast and tungsten lighting and resistance loads, do not derate for use on high-inrush loads.
2. Power Contacts:

    a. Double break, silver cadmium oxide.
    b. Auxiliary arcing contacts not acceptable.
    c. Convertible Contacts, N.O. or N.C.
    d. Contact status, N.O. or N.C., clearly visible.

3. Approved per UL 508.
4. Design in accordance with NEMA ICS2-211B, rated for application to 600 volt maximum.
5. Electrically Operated and Mechanically Held Contactor: Encapsulated latch and unlatch coils, coil clearing contacts.

B. Power Contactors:

1. Continuously rated 30 to 800 amp per pole for types of ballast and tungsten lighting, resistance and motor loads.
2. Power Contacts:

    a. Totally enclosed contacts.
    b. Double break, silver cadmium oxide.
    c. Auxiliary arcing contacts not acceptable.
    d. Provide for contact inspection or replacement without disturbing line or load wiring.

3. Straight through wiring, terminals clearly marked.
4. Approved per UL 508.
5. Design in accordance with NEMA ICS2-211B, rated for application to 600 volt maximum.
6. Field Addition Accessories:

    a. Auxiliary contacts, 6 amp, 600 volt, N.O. or N.C. Maximum of four.
    b. Control circuit fuse holder, one or two fuses.
    c. Transient-suppression module for control circuit of 120 volt.

7. Electronically Operated and Mechanically Held Contactor: Encapsulated latch and unlatch coils, coil clearing contacts.

C. Enclosures: NEMA enclosure suitable for location and use, flush or surface mount as indicated on Drawings.

2.03 ELECTRONIC TIME SWITCHES

A. Digital time clock: Double pole, single throw. One N.O. and one N.C. contact. 24 hours operation mode. Astronomical time clock. Holiday schedule. Battery power source to provide minimum three years memory backup. Eight event setpoints. Enclosure with hinged door.

2.04 PHOTOELECTRIC SWITCHES

A. Characteristics:

1. Hermetically sealed light sensitive element installed in die cast weatherproof enclosure.
2. Adjustable external light level slide.
3. Swivel adjustable enclosure.

B. Electrical Rating: 120VAC, 1800VA, connected for pilot duty unless otherwise indicated.

2.05 EMERGENCY LIGHTING RELAY

A. UL924 listed for connected load of 20 amps at 277 volt or 120 volt.

B. UL rated N.C. contacts, minimum 20 amps rating.

C. Integral surge protection.

D. Two separate status emergency lighting indicators for troubleshooting:

1. Amber LED indicates presence of normal utility power.
2. Red LED indicates presence of unswitched emergency power.

E. Manual and/or automatic diagnostic testing feature.

F. Dimming control: Where 0-10 volt dimming control is connected to emergency lighting, supply and connect auxiliary relay to open dimming 0-10 volt control circuit upon loss of normal power, or else supply emergency lighting relay with integral contact to open 0-10 volt control circuit.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Testing:

1. Test to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with approved drawings and specifications.

a. Daylight sensing automatic lighting controls.
b. Occupant sensing automatic lighting controls.
c. Automatic time switches for lighting control.

d. Emergency lighting controls.

2. Functionally test all control devices to ensure operation in accordance with approved drawings and specifications.
3. Prepare and complete report of test procedures and results and file with the Owner.

B. Install items per manufacturers written instructions.

3.02 CONTACTORS

A. Provide vibration isolation mounting pads for electrically held contactors installed within or on walls which are common to occupied spaces. Isolate terminals and operating mechanisms from enclosure.

B. Install contactors and relays to reduce noise such that it will not create a disturbance or distraction in the areas in which such equipment is located.

3.03 ELECTRONIC TIME SWITCHES

A. Install time switches and other automatic control devices in accessible locations near the source of power or grouped at a common location in mechanical rooms or similar spaces.

3.04 PHOTOELECTRIC SWITCHES

A. Install photoelectric control devices at such locations as necessary to be most effective. Avoid locating photoelectric devices in or at locations where they can be influenced by other than natural light or under eaves. Verify location of equipment with Architect.

B. Exterior Lighting Control: Control exterior lighting and interior atrium lighting using photoelectric switches to energize contactors controlling lighting circuits. Time clocks used to deenergize lighting at any preset time if desired.

3.05 EMERGENCY LIGHTING RELAYS

A. Emergency Relay (UL924):

1. Provide unswitched emergency circuit, and unswitched and switched normal circuit to UL924 relay for control of emergency luminaires with remaining room luminaires on normal power.
2. Install each relay within dedicated 4-11/16-inch junction box with double-gang plaster ring for wall or ceiling flush-mount as indicated on Drawings. Where location in ceiling would interfere with removal of ceiling tiles, install relay flush-mounted in nearest wall at ceiling level. Do not locate behind wall switch.

3. Where 0-10 volt dimming control is connected to emergency lighting, supply and connect auxiliary relay to open dimming 0-10 volt control circuit upon loss of normal power.

END OF SECTION

SECTION 260923 – OCCUPANCY AND VACANCY SENSORS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Occupancy/Vacancy Sensors (Ceiling Mounted)
2. Combined Occupancy Sensor/Wall Switches ("Sensor/Switches")

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Provide wiring diagrams indicating low voltage and line voltage wiring requirements.
2. Provide, on reproducible architectural floor plan, a layout of sensors indicating their sensing distribution.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Use manufacturer's published testing and adjusting procedures to adjust sensors time delay, daylight sensitivity, and passive infrared sensitivity to satisfaction of the Owner, in compliance with Washington State Energy Code, C408.3.
2. Prepare and complete report of test procedures and results. Submit these test procedures and results to Owner and Architect.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Occupancy/Vacancy Sensors (Ceiling Mounted):

1. Passive Infrared Occupancy/Vacancy Sensors:

a. Acuity Controls
b. WattStopper
c. Leviton
d. Hubbell
e. Cooper/Greengate
f. Lutron
g. Or approved equivalent.

2. Ultrasonic Occupancy/Vacancy Sensors:

a. WattStopper
b. Leviton
c. Hubbell
d. Cooper/Greengate
e. Acuity Controls
f. Lutron
g. Or approved equivalent.

3. Dual Technology Occupancy/Vacancy Sensors:

a. WattStopper
b. Leviton
c. Hubbell
d. Cooper/Greengate
e. Acuity Controls
f. Lutron
g. Or approved equivalent.

B. Combined Occupancy Sensor/Wall Switches ("Sensor/Switches"):

1. Lutron
2. Acuity Controls
3. WattStopper
4. Leviton
5. Hubbell
6. Cooper/Greengate

7. Or approved equivalent.

C. Basis of Design: Occupancy/Vacancy sensor layout on Drawings are designed based on Lutron product line. Approved manufacturers listed are allowed on condition of meeting the specified conditions including complete sensor coverage of the area controlled and switching of luminaires in the area controlled. Provide additional sensors and power switch packs as needed to provide the same level of functionality as shown on Drawings or required in Specifications. Remove and replace electrical equipment installed not meeting these conditions at no cost to Owner.

2.02 GENERAL

A. Occupancy sensor designation indicates sensors automatically turn lights ON when the sensor detects the presence of a person and will automatically turn lights OFF when no presence is detected for a specified amount of time (automatic-on and automatic-off).

B. Vacancy sensor designation requires someone to manually turn the lights ON. The sensor will then automatically turn the lights OFF when no presence is detected for a specified amount of time (manual-on and automatic-off).

C. Provide occupancy sensors to sense presence of human activity within desired space and enable or disable on/off manual lighting control function provided by local switches.

D. Upon detection of human activity by detector, sensor initiates time delay to maintain lights on for present period of time. Field adjustable time delay setting from 30 seconds to 15 minutes.

E. Factory set sensors for maximum sensitivity.

F. LED lamp built into sensor indicates when occupant is detected.

G. Provide zero cross relay control with sensors and sensor/switched; relay contacts close and open with AC voltage signal is at zero.

H. Where line voltage sensors and sensor/switches are used, provide to match voltage of controlled circuit.

I. Line Voltage Sensors, Control Units, and Relays: UL listed.

2.03 OCCUPANCY/VACANCY SENSORS (CEILING MOUNTED)

A. Passive Infrared Sensors:

1. Sensor Function: Detects human presence in floor area being controlled by detecting changes in Infrared energy. Sensor detects small movements, i.e., when people are writing while seated at a desk.
2. Provide temperature compensated dual element pyro-electric sensor and with multi element Fresnel lens.
3. Provide daylight filter to ensure that sensor is insensitive to short-wavelength infrared waves, i.e., those emitted by sun.

4. Sensor utilizes advanced digital signal processing technology to reduce false offs without reducing sensitivity.
5. Sensor utilizes DIP switches for adjustment to time delay and override. Field adjustable settings for sensitivity.
6. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel to allow coverage of large areas.
7. Provide adjustments and mounting hardware under removable cover to prevent tampering.
8. Finish: White.
9. Ceiling-Mounted Sensor:

    a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
    b. 360 degree sensor range; Coverage: 1,200-square feet, unless otherwise noted on Drawings.
    c. Provide internal form C dry contacts for HVAC control.

10. Building Exterior Sensor:

    a. Capable of mounting on walls, eaves or ceilings.
    b. On/off control based on daylight levels via adjustable light level setting.
    c. Line Voltage: provide sensor to match voltage of lighting controlled; capable of switching up to 1000 watts ballast and incandescent load.
    d. Adjustable time delay from 5 to 30 minutes.
    e. Silicon gasketed to prevent water and dust intrusion. UL listed raintight.
    f. Rated to operate in temperatures from -40 degrees F to 167 degrees F.
    g. Coverage:

        1) 360 degree lens with maximum coverage 48 feet diameter from 8-foot height.
        2) 360 degree lens with maximum coverage 40 feet diameter from 20-foot height.
        3) 360 degree lens with maximum coverage 100 feet diameter from 40-foot height.

B. Ultrasonic Occupancy/Vacancy Sensors:

1. Sensor Function: Detects human presence in controlled floor area by detecting Doppler shifts in 40kHz ultrasound created by sensor.
2. Sensors are precision crystal controlled and do not interfere with each other when two or more are placed in same area. Sensor includes advanced digital signal processing to reduce false on signals without decreasing sensitivity, as well as immunity to RFI/EMI sources.
3. Sensor utilizes DIP switches for adjustment to time delay and override. Field adjustable settings for sensitivity.
4. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel to allow coverage of large areas.
5. Provide adjustments and mounting hardware under removable cover to prevent tampering.
6. Finish: White.
7. Ceiling-Mounted Sensor:

a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
b. Maximum protrusion of 1.1-inches and blend in aesthetically with ceiling.
c. 360 degree sensor range; Coverage: 2,000-square feet, unless otherwise noted on Drawings.
d. Provide internal form C dry contacts for HVAC control.

8. Ceiling Mounted Sensor – Hallway Sensor Coverage:

a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
b. Maximum protrusion of 1.5-inches and blend in aesthetically with ceiling.
c. Coverage: 90 linear feet.
d. Provide internal form C dry contacts for HVAC control.

C. Dual Technology Sensors:

1. Sensor Function: Combined capability of passive infrared with ultrasonic or microphonic technology as described above. Upon a person entering a space, motion must be sensed by both technologies before lighting will be turned on. After this has occurred, detection by either technology will hold lighting on. Sensors retrigger time delay where only one motion is necessary to turn on lights within 5 seconds after turning off.
2. Sensor utilizes DIP switches for adjustment to time delay and override. Field adjustable settings for sensitivity.
3. Low Voltage Sensor: 24VDC power. Sensor operates remote power switch packs. Multiple sensors can be wired in parallel to allow coverage of large areas.
4. Ceiling-Mounted Sensor:

a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
b. 360 degree sensor range; Coverage: 1,000-square feet for half-step motion, unless otherwise noted on Drawings.
c. Provide internal form C dry contacts for HVAC control.

2.04 COMBINED OCCUPANCY SENSOR/WALL SWITCHES ("SENSOR/SWITCHES")

A. Completely self-contained sensor system that fits into standard single gang box. Internal transformer power supply, latching dry contact relay switching mechanism compatible with LED drivers, compact fluorescent, and inductive loads. Triac and other harmonic generating devices are not allowed.

B. Passive infrared sensor technology includes advanced signal processing to reduce false triggers without increasing sensitivity. LED indicator blinks when occupant sensed.

C. Rated to switch loads: 1000 watts at 120-volt; 1200 watts at 277 volt. Zero-crossing technology switches lighting off when AC voltage is at zero, minimizes contact wear.

D. Adjustable high-end and low-end trim setting.

E. Provide adjustable daylight feature that holds lighting "off" when desired footcandle level is present.

F. Provide integral off override switch with no leakage current to load or ground.

G. Vandal-resistant lens.

H. Includes neutral wire to meet NEC.

I. Finish: White.

J. Alerts for impending shut-off: light flash, audible, both or none.

K. Standard Sensor/Switch:

1. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off). Factory set to manual on/auto off.
2. 180 degree sensor range; Coverage: 180-square feet for desktop activity.

L. Dual Relay Sensor/Switch:

1. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
2. Dual auto-off buttons on face of switch allow end-user to turn off two switch legs in room space. Built-in light adjustable level sensor only turns off second of two relays when desired footcandle level is present. Otherwise similar to specifications above for single-zone sensor/switch.
3. Defaults to Manual-ON to 50 percent operation for maximum energy savings.
4. 180 degree sensor range; Coverage: 150-square feet for desktop activity.
5. Finish: White.

M. Passive Infrared Sensor/1-10V Dimmer:

1. Integral 0-10V dimming control with separate dim/bright controls allows for full range dimming of LED lighting levels from 0 to 100 percent. Press and hold to dim is not acceptable. Separate manual button for override 'off' control.
2. 180 degree sensor range; Coverage: 180-square feet for desktop activity.

N. Sensor/Slide Dimmer:

1. Line voltage dimmer allows for adjustment of lighting levels from 100 percent to 10 percent; compatible with two-wire line voltage 100 percent to 10 percent electronic dimming ballasts. Separate manual button for override 'off' control.
2. 180 degree sensor range; Coverage: 300-square feet for desktop activity.

O. Passive Infrared Wall Switch Vacancy-Only Sensors:

1. Operates only as a vacancy sensor (manual-on and automatic-off).
2. Adjustable sensitivity (high, low presets).

P. Dual Technology Wall Switch Vacancy-Only Sensors:

1. Operates only as a vacancy sensor (manual-on and automatic-off).
2. Adjustable sensitivity (high, medium, low, and off presets) individually for passive infrared and ultrasonic sensing.

Q. Passive Infrared Wall Dimmer Vacancy-Only Sensors:

1. Operates only as a vacancy sensor (manual-on and automatic-off).

R. Passive Infrared 0-10 V Wall Dimmer Vacancy-Only Sensors:

1. Operates only as a vacancy sensor (manual-on and automatic-off).

S. Dual Technology 0-10V Wall Dimmer Vacancy Sensors:

1. Operates only as a vacancy sensor (manual-on and automatic-off).

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Install occupancy/vacancy sensors as directed by manufacturer's instructions. Complete connections to control circuits, occupancy sensors, power supply pack and low voltage wiring.

B. Provide power packs for sensor to control number of circuits and/or switch legs within its area of coverage.

C. Field adjust each sensor to maximize its coverage of room space.

D. Relocate sensors with ultrasonic technology to avoid being closer to HVAC diffusers and power packs than recommended by manufacturer.

E. Field set time delay for each device as noted below:

1. Offices, Workrooms: 30 minutes.
2. Restrooms: 15 minutes.
3. Storage Rooms, Janitor's Closets, Unisex Restrooms: 5 minutes.
4. All Other Spaces: 15 minutes.

F. Coordinate HVAC control requirements with controls contractor prior to installation.

G. Lighting System Testing and Commissioning:

1. Test lighting controls to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with Drawings and Specifications. Provide functional testing of sequences of operation to ensure operation in accordance with Drawings and Specifications. Provide complete report of test procedures and results to engineer and insert approved copy into project closeout documents.
2. Testing includes:

a. Daylight Automatic Controls.

b. Occupant Sensing Automatic Controls.
c. Automatic Time and Override Controls for Interior Lighting.
d. Automatic Time and Photo Controls for Exterior Lighting.

END OF SECTION

SECTION 262416 – PANELBOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Power Distribution Panelboards
2. Panelboards

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Section 26 05 73, Electrical Distribution System Studies.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. UL 67, Standards for Panelboards.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Product Data: For each type of panelboard, overcurrent protective device, surge protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
2. Shop Drawings: For each panelboard and related equipment.

    a. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

        1) Enclosure types and details for types other than NEMA 250, Type 1.

2) Bus configuration, current, and voltage ratings.
3) Short-circuit current rating of panelboards and overcurrent protective devices.
4) Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

b. Wiring Diagrams: Power, signal, and control wiring.

3. Operation and Maintenance Manuals:

a. After completion of work and start-up of the equipment at the project site, deliver to the Owner's Authorized Representative operation instructions, maintenance manuals and drawings presenting full details for care and maintenance of each type of equipment provided under this Contract. Number of copies in accordance with Division 01.
b. Each copy to contain the operating and maintenance information and parts lists for equipment provided under this Contract. When necessary, provide supplemental drawings to show system operation and servicing maintenance points. For electrical components, provide wiring and connection diagrams. Include instructions required to accomplish specified operation and functions. Data to be neat, clean and legible.
c. Panelboard drawings and wiring diagrams to be included and up to date at the completion of start-up and system acceptance by the Owner. Drawings and wiring diagrams to include any field modifications or changes to reflect actual as-installed conditions.
d. In general, the manual to include, but not necessarily be limited to, the following:

1) Panelboard Elevation and One Line.
2) AC and DC Schematic and Physical Component Layout Drawings.
3) Remote Interface Drawing.
4) Bill of Material.
5) Description of Operation.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Power Distribution Panelboards:

1. Basis of Design: Eaton
2. ABB/General Electric
3. Siemens
4. Basis of Design: Schneider Electric/Square D
5. Or approved equivalent.

B. Panelboards:

1. Basis of Design: Eaton
2. ABB/General Electric
3. Siemens
4. Basis of Design: Schneider Electric/Square D
5. Or approved equivalent.

C. Manufacturers listed above are allowed on condition of meeting specified conditions including available space for equipment, Code required working clearances, and amps interrupting capacity (AIC) per short circuit study in Section 260573, Electrical Distribution System Studies. Prior to submitting bid, manufacturer to provide documentation to Engineer verifying specific conditions, including those mentioned above, can be met. Remove and replace electrical equipment installed, at no cost to the Owner, that does not meet these conditions.

2.02 POWER DISTRIBUTION PANELBOARDS

A. Description: NEMA PB 1 as indicated on drawings, circuit breaker type.

B. Integrated Equipment Rating: Provide fully rated integrated equipment rating greater than the available fault current. Series rated panelboards are not acceptable. Reference drawings for available fault currents. If drawings do not have available fault current shown, then coordinate with serving electrical utility. Final rating based on the protective device study completed under the provisions of Division 26, Electrical Distribution System Studies.

C. Panelboard Bus: Non-reduced copper, ratings as indicated on drawings. Bus bar with suitable electroplating (tin) for corrosion control at connection. Provide copper ground bus in each panelboard.

D. Lugs: Mechanical type for copper conductors. All device terminals/lugs shall be rated for a minimum of 75 degrees C to facilitate the use of 75 degrees C conductor ampacity rating.

E. Molded Case Circuit Breakers: With integral thermal and instantaneous magnetic trip in each pole; UL listed. For air conditioning equipment branch circuits provide circuit breakers UL listed as Type HACR.

F. Molded Case Circuit Breakers with Current Limiters: With replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole; UL listed.

G. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.

H. Circuit Breakers 1200 Amp and Greater: Provide breaker with energy-reducing maintenance switching with local status indicator per NEC Article 240.87(B).

I. Fully equip unused spaces for future devices, including manufacturer required connections and mounting hardware.

J. Cabinet Front: Surface type hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

K. Surge Protective Device: Provide for emergency distribution systems equipment as required per NEC Article 700.8.

2.03 PANELBOARDS

A. Description: Panelboards 400 amps or less. NEMA PB1, Type 1 or as indicated on drawings, circuit breaker type. Maximum enclosure depth: 6-inches for surface mounted, 5-3/4-inches for flush mounted.

B. Maximum Width: 20-inches.

C. Integrated Equipment Rating: Provide fully rated integrated equipment rating greater than the available fault current. Series rated panelboards are not acceptable. Reference drawings for available fault current. If drawings do not have available fault current shown, then coordinate with serving electrical utility. Final rating based on the protective device study completed under the provisions of Division 26, Electrical Distribution System Studies.

D. Panelboard Bus Non-Reduced: Copper, ratings as indicated on drawings. Bus bar with suitable electroplating (tin) for corrosion control at connection. Provide copper ground bus in each panelboard.

E. Lugs: Mechanical type for copper conductors. All device terminals/lugs shall be rated for a minimum of 75 degrees C to facilitate the use of 75 degrees C conductor ampacity rating.

F. Provide double lugs and/or feed-through lugs for feed through feeders.

G. Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for poles; UL listed. Predrill bus for bolt-on breakers.

1. Type SWD for lighting circuits.
2. Type HACR for air conditioning equipment circuits.
3. Class A ground fault interrupter circuit breakers where scheduled.
4. Class B ground fault equipment protection circuit breakers for heat trace and other circuits as required by Code. Provide shunt trip circuit breakers where scheduled; provide wiring to remote trip switch/contacts as indicated on Drawings.
5. Do not use tandem circuit breakers.

H. Cabinet Front: Provide flush or surface mounting as shown on the schedules, drawings, or otherwise noted. Cabinet front with concealed hinged front cover construction, metal directory frame with heavy clear plastic protector, flush lift latch and lock, two keys per panel all keyed alike.

I. Provide boxes with removable blank end walls and interior mounting studs. Provide interior support bracket for ease of interior installation.

J. Furnish surface mounted cabinet boxes without knockouts.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Install panelboards in accordance with NEMA PB 1.1, NECA 1 and manufacturer's installation instructions.

B. Install panelboards level and plumb. Install recessed panelboards flush with wall finishes.

C. Height: 6-feet 6-inches to top of panelboard; install panelboards taller than 6-feet 6-inches with bottom no more than 4-inches above floor.

D. Provide filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard. Include all "spaces" and "spares." Revise directory to reflect circuiting changes and as-installed conditions. Use final Owner designated room names and numbers, and not designations shown on drawings.

F. Provide engraved plastic nameplates per Section 26 05 53, Identification for Electrical Systems.

G. Provide arc flash labels per Section 26 05 73, Electrical Distribution System Studies.

H. Provide concrete housekeeping pad for floor-mounted distribution panelboards. Extend 6-inches beyond distribution panel width and depth dimensions. Minimum 3-inches above finished floor. Install plumb and level.

I. Provide permanent identification number in or on panelboard dead-front adjacent to each breaker pole position. Horizontal centerline of numbers to correspond with centerline of circuit breaker pole position.

J. Ground and bond panelboard enclosure per NEC.

K. Paint:

1. Standard factory finish unless noted otherwise.
2. Panelboards located in finished interior areas in view of building occupants; paint to match adjacent wall surface. Color and paint preparation as specified by Architect. Covers to be painted off wall, then installed over dried, painted wall surface.

L. Provide handle guards on each circuit supplying obviously constant loads such as fire alarm, security, lighting controls, refrigerators and freezers, fire protection, etc.

M. Provide interior wiring diagram, neutral wiring diagram, UL label, and short circuit rating on interior or in booklet format inserted in sleeve inside panel cover.

N. Verify available recessing depth and coordinate wall framing with other divisions.

O. Maintain fire rating of wall where panels are installed flush in fire rated walls.

P. Perform inspections and tests in accordance with manufacturer's requirements.

Q. Thoroughly clean exterior and interior of each panelboard in accordance with manufacturer's installation instructions.

R. Vacuum construction dust, dirt, and debris out of each panelboard.

S. Where enclosure finish is damaged, touch up finish with matching paint in accordance with manufacturer's specifications and installation instructions.

3.02 POWER DISTRIBUTION PANELBOARDS INSTALLATION

A. Breakers being added to existing panelboards: Coordinate breaker type and short circuit rating with existing panelboard. Breakers to match existing in manufacturer's type and AIC rating. Provide new typed circuit directory.

B. Provide handle tie to branch circuit breakers of multiwire branch circuits for simultaneous disconnection of circuits. Handle tie will be identified for use with circuit breakers provided. Reconfigure assigned circuits as necessary so that circuit breakers associate with multiwire branch circuits are physically adjacent, record changes in panelboard schedules and circuiting plans for record drawings.

C. Shunt Trip Circuit Breakers: Provide wiring to remote trip switch/contacts as indicated on Drawings.

D. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

3.03 PANELBOARDS INSTALLATION

A. Breakers being added to existing panelboards: Coordinate breaker type and short circuit rating with existing panelboard. Breakers to match existing in manufacturer's type and AIC rating. Provide new typed circuit directory.

B. Provide handle tie to branch circuit breakers of multiwire branch circuits for simultaneous disconnection of circuits. Handle tie will be identified for use with circuit breakers provided. Reconfigure assigned circuits as necessary so that circuit breakers associate with multiwire

branch circuits are physically adjacent, record changes in panelboard schedules and circuiting plans for record drawings.

C. Shunt Trip Circuit Breakers: Provide wiring to remote trip switch/contacts as indicated on Drawings.

D. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION

SECTION 262653 – ELECTRICAL VEHICLE CHARGING EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Electric Vehicle Charging Station
2. Electric Vehicle Cable and Connectors
3. Accessories

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1. Section 26 05 73, Electrical Distribution System Studies

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. NEC Article 625, Electric Vehicle Power Transfer System
2. UL 2231-1, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements
3. UL 2231-2, Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Requirements for Protection Devices for Use in Charging Systems
4. UL 2594, Standard for Electric Vehicle Supply Equipment
5. SAE Surface Vehicle Recommended Practice J1772, SAE Electric Vehicle Conductive Charge Coupler
6. FCC Part 15 Class A
7. ADA Compliant

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan, elevation and section views with overall and interconnection point dimensions, method of field assembly, components, mounting and attachment details, and electrical diagrams including schematic and interconnection diagrams for power, signal, and control wiring.
2. Product Data: Provide data showing dimensions, weights, loads, ratings, and required clearances, interconnection points, and internal wiring diagrams.
3. Verification: Include verification of wireless communications service at each location of EV charging equipment.
4. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
5. Operation Data: Include instructions for normal operation, with description and illustration of charging station.
6. Software and Firmware Operational Documentation:

    a. Online training and help documentation.
    b. Station activation sticker.

7. Maintenance Data: Include instructions for routine maintenance and testing requirements, service manuals for charging station.
8. Maintenance Agreement: Provide optional authorized dealer service contract to perform routine maintenance and service for a period of 5 years to Owner for comment and/or approval.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. Source Limitations: Obtain EV charging equipment from single manufacturer.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

D. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience. Authorized distributor must have service facilities within 250 miles of Project and maintain qualified, factory trained service personnel that can respond within 24 hours notification.

E. Field Conditions: Maintain field conditions within manufacturer's required service conditions during and after installation.

F. Wireless Survey: Complete wireless survey to determine if wireless provider signals meet or exceed manufacturer's recommended minimum values.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 26 00 00, Electrical Basic Requirements and Division 01, General Requirements.

B. Manufacturer's Warranty: Manufacturer and Supplier agree to repair or replace components of EV charging units that fail(s) in materials or workmanship within specified warranty period.

1. Standard Warranty Period: One year from date of Substantial Completion.

C. Provide a comprehensive warranty that includes parts, labor, and travel to the site.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. EV Charging Equipment

1. ChargePoint
2. Clipper Creek
3. Or approved equivalent.

2.02 ELECTRIC VEHICLE CHARGING STATION

A. Charging Levels:

1. Dual port, Level 2 at up to 7.2 kW per vehicle.

B. Input Power:

1. Two 40A, 208/240-V ac, 60 Hz, single phase per charger.
2. Dual circuits do not need to be interlocked.

C. Height: 6-foot high.

D. Mounting: Bollard mounted.

E. Operating Conditions:

1. Rate equipment for continuous operation under the following conditions:

a. Ambient Temperature: Not exceeding minus 22 to plus 122 deg F (minus 30 to plus 50 deg C).

2. Rate equipment for non-operation under the following conditions:

a. Ambient Temperature: Not exceeding minus 40 to plus 140 deg F (minus 40 to plus 60 deg C).

3. Altitude: Not exceeding 6600 feet (2000 m).
4. Relative humidity: up to 85-percent at 122 deg F (non-condensing).

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

G. Surge Withstand: 6 kV at 3000 A.

H. Integral 20mA GFCI with continuous monitoring of presence of ground connection.

I. Auto-GFCI fault retry.

J. Metering: +/- 2 percent from 2 percent to full scale of output (30 A). Power report / store interval: 15 minutes, aligned to hour.

K. Energy Star certified.

L. Enclosures:

1. Rated for environmental conditions at installed location.

a. Indoor Locations: NEMA 250, Type 3R.
b. Outdoor Locations: NEMA 250, Type 3R.
c. Aluminum and UV-resistant plastic.
d. Paint and Anodized.
e. Charging components protected by security screws.
f. Charging connectors in locking holsters.
g. Meter, modem, and CPU, tamper resistant.

2.03 ELECTRIC VEHICLE CABLE AND CONNECTORS

A. Two SAE J1772 connectors with locking holster.

B. 18-foot (5.5 m) cable with gravity operated cable management system.

2.04 ACCESSORIES

A. Status Indicators:

1. LEDs to indicate power, charging, charging complete, system status, faults, and service.

B. Display Screen:

1. VGA-resolution, daylight-viewable LCD screen with UV protection. Daylight readable and fingerprint resistant.
2. Displays power, charging, charging complete, remote control, system status, faults, payment and pricing details, and service.
3. Touch button interface works in rain, ice and with gloves.
4. Instructional video shows how to use the station.

5. Multi-language charging instructions in English, Spanish and French.

C. Networking:

1. WAN Communications: Cellular GSM/GPRS and CDMA, LTE Category 4.
2. LAN Communications: 2.4 GHz Wi-Fi 802.11b/g/n.
3. Capable of remote configuration and reporting.

D. Payment System:

1. RFID (ISO 15693, ISO 14443), NFC, Contactless credit card reader.
2. PCI (Payment Card Industry) compliant.
3. Capable of remote control and authorization including mobile phone application or toll free phone number.

E. Charging Network: Compatible with the ChargePoint EV charging network.

1. Multiple units are to independently connect to charging network.
2. Multiple units are to have one unit designated as a master unit that is configured as a gateway unit between the EV charging equipment and the charging network.
3. Individual units are to be capable of indicating station status and availability providing or connecting user to customer support and remote control.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Install charging stations in accordance with NECA 1, NECA 413, and manufacturers' installation instructions.

B. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

C. Examine roughing-in for EV charging equipment electrical conduit to verify actual locations of conduit connections before equipment installation.

D. Examine walls, floors, or pavement for suitable conditions where EV charging equipment will be installed.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

F. Concrete Base Mounting:

1. Install EV charging equipment on 24-inch (600-mm) diameter or square and 24-inch (600- mm) deep concrete base. Comply with requirements for concrete base specified in Division 03.

a. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

b. Install anchor bolts to elevations required for proper attachment to supported equipment.
c. Secure EV charging equipment to concrete base according to manufacturer's written instructions.

G. Bollard Mounting:

1. Allow a minimum of 24 inches (600 mm) of clearance around EV charging equipment.
2. EV charging equipment receptacles or holders are not to be not less than 24 inches (600 mm) and not more than 4 feet (1.2 m) above finished grade.
3. Mount EV charging equipment plumb and rigid without distortion of enclosure.
4. Secure EV charging equipment according to manufacturer's written instructions.

H. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

I. Secure covers to enclosure.

J. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

3.02 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies and equipment installations, including connections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. For each unit of EV charging equipment, perform the following tests and inspections:

a. Unit self-test.
b. Operation test with load bank.
c. Operation test with EV.
d. Network communications test.

D. EV charging equipment will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.03 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.04 ONGOING MANAGEMENT SERVICES

A. Engage a station manufacturer that offers a service to manage the administration and policies of the electric vehicle charging stations on an ongoing basis.

3.05 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion, service agreement is to include software support for the duration of an active ChargePoint Network Service Plan.

B. Upgrade Service: At Substantial Completion, remotely update software to latest version. Install and program software upgrades that become available while an active ChargePoint Network Service Plan is maintained. Upgrading software is to include operating system and new or revised licenses for using software.

3.06 DEMONSTRATION

A. Utilize ChargePoint Station Management Services and ChargePoint Assure Services, or Train Owner's maintenance personnel to adjust, operate, and maintain EV charging equipment.

END OF SECTION

SECTION 262713 – ELECTRICAL METERING

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:

1. Utility Metering Equipment

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

B. In addition, reference the following:

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Product Data: List of components for power monitoring, including dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes. Attach copies of Submittals for effected products (such as switchboards and switchgear) that describe power monitoring features to coordinate Product Data related to power monitoring.
2. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on this Project.
    a. Outline Drawings: Indicate dimensions, weights, arrangement of components, and clearance and access requirements.
    b. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.

c. Wiring Diagrams: Detail specific wiring to suit Project. Coordinate nomenclature and presentation with a block diagram, and differentiate between manufacturer-installed and field-installed wiring.

3. Closeout Documentation: Documentation that details the start-up procedure being performed including a process to follow, details on tests performed, and an area that documents any test results.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, meet the following:

1. Energy metering to be of a single-source manufacturer of the major components within the assembly. Manufacturer will have documented experience in the manufacture of energy metering for a minimum of three years.
2. Installer will have documented experience in the installation of energy metering for a minimum of three years.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 26000, Electrical Basic Requirements Division 01, General Requirements.

1.07 COORDINATION

A. Coordinate features of distribution equipment and power monitoring components to form an integrated interconnection of compatible components.

1. Match components and interconnections for optimum performance of specified functions.
2. Coordinate Work of this Section with BAS to indicate and record designated alarms registered in power monitoring displays.

a. Coordinate power monitoring components so metered electrical load and demand values and associated summary and trend reports specified in this Section are made accessible to the BAS system.
b. Log and store data from power monitoring system to facilitate production of monthly reports associated with the facility.
c. Provide capacity to maintain logged data for a minimum of ten years. Provide auto archive capability and locally accessible storage.

B. Coordinate Work of this Section with that in Sections specifying distribution components that are monitored by power monitoring equipment.

C. Coordinate a communication link with BAS to meet input requirements of BAS integrator and gateway equipment provided as part of BAS installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:

1. Utility Metering Equipment

a. Meter Base:

1) Circle AW.
2) Or approved equivalent.

b. Metering Equipment Enclosure:

1) ABB/General Electric
2) Schneider Electric/Square D
3) Eaton Electrical
4) Siemens
5) Or approved equivalent.

2.02 UTILITY METERING EQUIPMENT

A. Meter Base: Surface or Flush mounted meter socket enclosure. Provide meter base(s) for energy/demand and reactive energy/demand bases as required by serving electric utility.

B. Terminal Cabinet: Provide terminal cabinet that meets serving utility company's requirements. Provide separate C.T. cabinet as detailed.

C. Provide fault withstand rating greater than utility determined available fault current.

D. C.T. Enclosure: Provide enclosure that meets serving utility company's requirements. Provide separate C.T. cabinet as detailed.

PART 3 - EXECUTION

3.01 UTILITY METERING INSTALLATION

A. Meter Bases: Locate to provide acceptable access for meter reading and maintenance. Locate to minimize risk of physical damage.

B. Metering Equipment: Install current transformers supplied by serving electric utility.

C. Verify utility requirements prior to bidding and provide associated work required by local utility including but not limited to:

1. Service underground primary including conduit, pull cord, excavation and backfill.
2. Underground pull vaults.

3. Pole risers.
4. Transformer pads, and vaults.
5. Secondary service lateral raceways.
6. Grounding of transformers.
7. Service metering equipment.

END OF SECTION

SECTION 262726 – WIRING DEVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Work Included: Provision of materials, installation and testing of:

1. Wall Switches
2. Receptacles
3. Finish Plates
4. Wall Dimmers
5. Surface Covers

1.02 RELATED SECTIONS

A. Contents of Division 26, Electrical and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.04 SUBMITTALS

A. Submittals as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Wall switches
2. Receptacles
3. Wall Plates
4. Dimmers
5. In-Use Cover

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 260000, Electrical Basic Requirements and Division 01, General Requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Wall Switches:

1. Toggle Type:

a. Cooper AH1201
b. Hubbell HBL1221
c. Leviton 1221
d. Legrand P&S PS20AC1
e. Or approved equivalent.

2. Decorative AC Rocker Switch:

a. Cooper
b. Hubbell
c. Leviton
d. Legrand P&S
e. Or approved equivalent.

B. Receptacles:

1. Industrial Grade – 20 Amp:

a. Cooper 5362
b. Hubbell HBL5362
c. Bryant BRY5362
d. Leviton 5362
e. Legrand P&S 5362A
f. Or approved equivalent.

2. Commercial Grade:

a. 20 Amp:

1) Cooper 5362
2) Hubbell 5362
3) Bryant CBRS20
4) Leviton 5362S
5) Legrand P&S 5362
6) Or approved equivalent.

3. Ground Fault Circuit Interrupter (GFCI) Receptacle – 20 Amp:

    a. Cooper WRSGF20W
    b. Hubbell GFR5362SGW
    c. Legrand P&S 2097TRWR
    d. Or approved equivalent.

C. Finish Plates:

1. Bryant
2. Cooper
3. Hubbell
4. Leviton
5. Legrand P&S
6. Or approved equivalent.

D. Wall Dimmers:

1. Lutron Maestro Series
2. Or approved equivalent.

E. Surface Covers:

1. Aluminum with Gasket, Blanks, Single Gang:

    a. Bell 240-ALF
    b. Carlon
    c. Or approved equivalent.

2. 2-Gang:

    a. Bell 236-ALF
    b. Carlon
    c. Or approved equivalent.

3. While-in-Use Weatherproof Cover:

    a. Die Cast Cover:

        1) Intermatic
        2) Hubbell
        3) Cooper
        4) Or approved equivalent.

F. Provide lighting switches and receptacles of common manufacturer and appearance.

2.02 WALL SWITCHES

A. Characteristics: Toggle type, quiet acting, 20 amp, 120/277 volt, UL listed for motor loads up to 80 percent of rated amperage, extra heavy duty.

B. Finish: White.

2.03 RECEPTACLES

A. Duplex Receptacles Characteristics: Straight parallel blade, 125 volt, 2 pole, 3 wire grounding.

1. Commercial Grade: Riveted. Back and side wired. Brass ground contact on steel strap. Nylon face and nylon base. 20 amp.

B. Ground Fault Circuit Interrupter (GFCI) Receptacle: Feed through type, back-and-side wired, tamper-resistant, weather resistant self-testing, 20 amp, 125VAC.

C. Special Purpose Receptacles: Reference Drawings for NEMA Standard Specification.

D. Finish:

1. Same exposed finish as switches.
2. Receptacles installed in surface raceway to match raceway finish. See Section 26 05 33, Raceways.
3. All automatically controlled, nonlocking type, 125 volt, 15 amp and 20 amp rated receptacles to be permanently marked by the manufacturer with the "universal power" symbol and the word "controlled."

2.04 FINISH PLATES

A. Finish Plates: Type 302 stainless steel with smooth satin finish.

B. Provide telephone/signal device plates; activated outlets to have coverplates to match modular jack.

2.05 WALL DIMMERS

A. Provide wall dimmers compatible with type of load controlled (i.e. line voltage, low voltage, 2-wire, 3-wire, 0-10v). Finish to match wall switches. Size dimmers to accept connected load. Do not cut fins. Where dimmers are ganged together, provide a single multi gang coverplate.

B. LED indicator dots show by what percentage controlled lighting is dimmed. Programmable settings for maximum and minimum trim settings, and rate of change in lighting levels.

2.06 SURFACE COVERS

A. Material: Galvanized steel, drawn, 1/2-inch raised industrial type with openings appropriate for devices installed on surface receptacles.

B. Cast Box and Extension Adaptors: Aluminum with gasket, blanks single gang or 2-gang.

C. While-in-Use Weatherproof Cover: NEMA 3R when closed over energized plug. Vertical mount for duplex receptacle. Provide continuous use cover with cover capable of closing over energized cord cap with bottom aperture for cord exit.

1. Die cast cover with closed cell neoprene foam gasket: Capable of being locked closed to prevent tampering or unauthorized use.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. See Architectural elevations for location and mounting height of wiring devices. Review Architectural elevations prior to rough-in and contact Architect immediately if conflicts are found between Architectural and Electrical Drawings. Do not rough-in devices until conflicts are resolved.

B. Install wiring devices and finish plates plumb with building lines, equipment cabinets and adjacent devices. Devices not plumb will be fixed at no additional cost to Owner.

C. Orientation:

1. Install wiring devices with long dimension oriented vertically at centerline height shown on drawings or as specified.
2. Vertical Alignment: When more than one device is shown on drawings in close proximity to each other, but at different elevations, align devices on a common vertical center line for best appearance. Verify with Architect.
3. Horizontal Alignment: When more than one device is shown on drawings in close proximity to each other with same elevation, align devices on a common horizontal center line for best appearance. Verify with Architect.

D. Provide labeling per Section 26 05 53, Identification for Electrical Systems.

E. Test wiring devices to ensure electrical continuity of grounding connections, and after energizing circuitry, to demonstrate compliance with requirements. Test receptacles for line to neutral, line to ground and neutral to ground faults. Correct any defective wiring.

3.02 WALL SWITCHES INSTALLATION

A. At time of substantial completion, replace those items which have been damaged.

3.03 RECEPTACLES INSTALLATION

A. Upon installation, adhere to proper and cautious use of convenience receptacles. At time of substantial completion, replace those items which have been damaged, including those burned and scored by faulty receptacles or cord caps.

B. In the following outlet locations, regardless of whether shown as GFCI on Drawings, either provide a GFCI duplex receptacle, or use a GFCI breaker where code would require a GFCI outlet to have a remote test switch:

1. Bathrooms.
2. Where receptacles are installed within 6-feet, 0-inches from edge of sinks.
3. Kitchens above counters.
4. On rooftops.
5. Outdoors.
6. Where serving vending machines.
7. Where serving electric drinking fountains.

C. GFCI Receptacles: One GFCI receptacle may not be used to provide GFCI protection to downstream duplex receptacles on the same branch circuit.

3.04 FINISH PLATES INSTALLATION

A. Do not install items until finish painting is complete. Replace scratched and paint splattered finish plates and wiring devices.

3.05 WALL DIMMERS INSTALLATION

A. Install per manufacturer's recommendations and wiring diagrams.

3.06 SURFACE COVERS INSTALLATION

A. Do not install items until finish painting is complete. Replace scratched and paint splattered finish plates and wiring devices.

END OF SECTION

SECTION 270000 – COMMUNICATIONS BASIC REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work included in 270000, Communications Basic Requirements applies to Division 27, Communications work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of communications systems for proposed project.

B. Contract Documents include, but are not limited to, Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Drawings, and Addenda. Confirm requirements before commencement of work.

C. Definitions:

1. Provide: Refer to Section 014200.
2. Furnish: Refer to Section 014200.
3. Install: Refer to Section 014200.
4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability, or longevity. For equipment/products defined by the Contractor as "equivalent," substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, Product Requirements, and approved by the Engineer prior to submitting bids for substituted items.
5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's insurance underwriter, Owner's Authorized Representative, and other reviewing entity whose approval is required to obtain systems acceptance.
6. Entrance Facility (EF): Area or location that contains entrance point (demarcation) cable and associated equipment for telecommunication services entering the building.
7. Equipment Room (ER): Area or location that contains backbone cabling associated with interbuilding cable or cable that connects buildings together in a campus environment. ERs may contain Main Cross-Connects, Intermediate Cross-Connects, Horizontal Cross-Connects, and Telecommunication Rooms.
8. Main Cross-Connect (MC): Area or location that contains telecommunications equipment for connecting backbone cable to/from Intermediate Cross-Connects and Horizontal Cross-Connects. Active telecommunications equipment will often be contained in this area to serve as the telecommunications hub or headend. Backbone cable from Local Exchange Carrier's point of demarcation will connect to building backbone cable or active telecommunications equipment at this location.
9. Main Point of Entry (MPOE): Area or location where service providers terminate and handoff to customer owned premise cabling system.
10. Main Telecommunications Room (MTR): Location that services as the main distribution point for Client/Owner telecommunications system. The MTR connects to each TR and the MPOE. MTR should not be accessible by the service providers. In most cases the MTR is a private space.
11. Intermediate Cross-Connect (IC): Area or location that contains telecommunications equipment for connecting backbone cable from the MC to backbone cable distributing to

one or many Horizontal Cross-Connects. This location may contain active telecommunications equipment.

12. Horizontal Cross-Connect (HC): Area or location that contains telecommunications equipment, cable terminations and cross-connect wiring. HC is the recognized connection point between backbone and horizontal pathway facilities.
13. Telecommunications Room (TR): Area or location containing telecommunications equipment, cable terminations and cross-connect wiring. Three applications serviced by TRs are horizontal cable connections, backbone system interconnection and entrance facilities. The TR provides facilities (space, power, grounding, etc.) for housing telecommunications equipment. TR may contain a MC, IC or HC and a demarcation point or an interbuilding entrance facility.
14. Interbuilding Cable: Backbone cable associated with connecting buildings together in a multibuilding or campus environment.
15. Intrabuilding Cable: Backbone cable associated with connecting Entrance Facility, Equipment Rooms, Main Cross-Connects, Intermediate Cross-Connects, Horizontal Cross-Connects, and Telecommunication Rooms together on single floor or multi-floor building.

1.02 RELATED SECTIONS

A. Related Work:

1. Additional conditions apply to this Division including, but not limited to:

   a. Specifications including Division 00, Procurement and Contracting Requirements and Division 01, General Requirements.
   b. Drawings
   c. Addenda
   d. Codes, Standards, Public Ordinances and Permits

1.03 REFERENCES AND STANDARDS

A. References and Standards per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, individual Division 27, Communications Sections, and those listed in this Section.

B. Codes to include latest adopted editions, including current amendments, supplements, and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:

1. State of Washington:

   a. IBC – International Building Code
   b. IFC – International Fire Code
   c. IMC – International Mechanical Code
   d. NEC – National Electrical Code
   e. UPC – Uniform Plumbing Code
   f. WAC – Washington Administrative Code
   g. WSEC – Washington State Energy Code

C. Reference codes, standards and guidelines include but are not limited to the latest adopted editions from:

1. ABA – Architectural Barriers Act
2. ADA – Americans with Disabilities Act
3. ANSI – American National Standards Institute

    a. ANSI/TIA-526-7-A – Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
    b. ANSI/TIA-526-14-C Optical Power Loss of Installed Multimode Fiber Cable Plant
    c. ANSI/TIA-568.0-D – Generic Telecommunications Cabling for Customer Premises
    d. ANSI/TIA-568.1-D – Commercial Building Telecommunications Infrastructure Standard
    e. ANSI/TIA-568.2-D – Balanced Twisted-Pair Telecommunications Cabling and Components Standard
    f. ANSI/TIA-568.2-D-2 – Balanced Twisted-Pair Telecommunications Cabling and Components Standard, Addendum 2
    g. ANSI/TIA-568.3-D – Optical Fiber Cabling Components Standard. Commercial Building Telecommunications Cabling Standard
    h. ANSI/TIA-568.3-D-1 – Optical Fiber Cabling Components Standard.
    i. ANSI/TIA-568.4-D – Broadband Coaxial Cabling and Components
    j. ANSI/TIA-569-E – Commercial Building Standard for Telecommunications Pathways and Spaces
    k. ANSI/TIA-570-D – Residential Telecommunications Infrastructure Standard
    l. ANSI/TIA-598-D – Optical Fiber Cable Color Coding
    m. ANSI/TIA-598-D-1 – Optical Fiber Color Coding in Cable Addendum 1, additional Colors for Elements 3-16
    n. ANSI/TIA-598-D-2 – Optical Fiber Cable Color Coding Addendum 2, Jacket Color for OM5 Indoor Fiber Cables
    o. ANSI/TIA-606-C – Administration Standard for Commercial Telecommunications Infrastructure
    p. ANSI/TIA-J-STD-607-D – Generic Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
    q. TIA-758-B Customer-Owned Outside Plant Telecommunications Infrastructure Standard
    r. ANSI/TIA-942-B – Telecommunications Infrastructure Standard for Data Centers

4. APWA – American Public Works Association
5. ASCE – American Society of Civil Engineers
6. ASHRAE – Guideline 0, the Commissioning Process
7. ASIS INTL – American Society for Industrial Security International
8. ASTM – ASTM International
9. AVIXA – Producer of InfoComm and international trade organization representing the audiovisual industry
10. BICSI – Building Industry Consulting Service International

    a. BICSI TDMM – Telecommunications Distribution Methods Manual, 14th Edition, 2020
    b. BICSI ITSIMM – Information Technology Systems Installation Methods Manual, 8th Edition, 2022

c. BICSI OSPDRM – Outside Plant Design Reference Manual, 6th Edition, 2018

11. CFR – Code of Federal Regulations
12. EPA – Environmental Protection Agency
13. ETL – Electrical Testing Laboratories
14. FCC – Federal Communications Division
15. IBC – International Building Code
16. IEC – International Electrotechnical Commission
17. IEEE – Institute of Electrical and Electronics Engineers
18. IFC – International Fire Code
19. ISO – International Organization for Standardization
20. NEC – National Electric Code
21. NEMA – National Electrical Manufacturers Association
22. OSHA – Occupational Safety and Health Administration
23. TIA – Telecommunications Industry Association
24. UL – Underwriters Laboratories Inc.

1.04 SUBMITTALS

A. See Division 01, General Requirements for Submittal Procedures.

B. Provide drawings in format and software release equal to the design documents. Drawings to be the same sheet size and scale as the Contract Documents.

C. In addition:

1. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.
2. Provide product submittals and shop drawings in electronic format only. Electronic format must be posted to ftp site. For electronic format, provide one file per division containing one bookmarked PDF file with each bookmark corresponding to each Specification Section. Arrange bookmarks in ascending order of Specification Section number. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. Copy Architect on all transmissions/submissions.
3. Product Data: Provide manufacturer's descriptive literature for products specified in Division 27, Communications Sections.
4. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the specifications and Drawings.

    a. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross

out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.

b. Provide a red rectangle around part number and description with corresponding red arrow pointing to the item/material being submitted.

1) Submit one submittal per specification section in Division 27. As stated above, identify all items being submitted for approval prior to installation.

c. Include technical data, installation instructions, and dimensioned drawings for products, fixtures, equipment, and devices installed, furnished, or provided. Reference individual Division 27, Communications specification Sections for specific items required in product data submittal outside of these requirements.

d. See Division 27, Communications individual Sections for additional submittal requirements outside of these requirements.

5. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of additional reviews at Engineer's hourly rates. Incomplete submittal packages/submittals will be returned to contractor without review.
6. Resubmission Requirements: Make corrections or changes in submittals as required, and in consideration of Engineer’s comments. Identify Engineer’s comments and provide an individual response to each of the Engineer’s comments. Cloud changes in the submittals and further identify changes which are in response to Engineer’s comments.
7. Structural/Seismic: Provide weights, dimensions, mounting requirements and like information required for mounting, seismic bracing, and support to meet the AHJ terms of satisfaction. Indicate manufacturer's installation and support requirements to meet ASCE 7-16 requirements for non-structural components.
8. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 27, Communications Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.
9. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
10. Substitutions and Variation from Basis of Design:

a. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.

b. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid, including resulting charges for work performed under other Divisions, will be allowed for such revisions. Coordinate with the requirements of "Submittals." For any product marked "or approved equivalent," a substitution

request must be submitted to Engineer for approval prior to purchase, delivery or installation.

11. Shop Drawings:

    a. Provide coordinated Shop Drawings which include physical characteristics of all systems, device layout plans, and control wiring diagrams. Reference individual Division 27, Communications specification Sections for additional requirements for Shop Drawings outside of these requirements.
    b. Provide Shop Drawings indicating access panel locations, size, and elevation for approval prior to installation.
    c. Provide Shop Drawings indicating all elevations for proposed layouts of equipment on all walls and for each rack elevation. This is required to obtain approval prior to installations. No work will be accepted prior to the approval process. Contractor is to submit for all wall elevations and rack elevations per these specifications and as illustrated on the drawings. If a conflict exists, contractor shall bring it to the attention of the Owner and work to a satisfactory solution that meets the terms of satisfaction.

        1) Contents shall include all walls, racks where Contractor proposes to install submittal material and equipment.

12. Samples: Provide samples when requested by individual Sections.
13. Resubmission Requirements:

    a. Make any corrections or change in submittals when required. Provide submittals as specified. The Engineer will not be required to edit and/or interpret the Contractor's submittals. Changes made for the resubmittal will be indicated in a cover letter with reference to page(s) changed and will reference response to comment. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
    b. Resubmit for review until review indicates no exception taken, or "make corrections as noted."
    c. When submitting Drawings for Engineer's re-review, clearly indicate changes on Drawings and "cloud" any revisions. Submit a list describing each change.

14. Operation and Maintenance Manuals, Owner's Instructions:

    a. Submit, at one time, three bound copies and electronic files (native/searchable PDF format) of manufacturer's operation and maintenance instruction manuals and parts lists for equipment or items requiring servicing. Submit data when work is substantially complete and in same order format as submittals. Include name and location of source parts and service for each piece of equipment.

        1) Include copy of approved submittal data along with submittal review letters received from Engineer. Data to clearly indicate installed equipment model numbers. Delete or cross out data pertaining to other equipment not specific to this project.
        2) Include copy of manufacturer's standard Operations and Maintenance for equipment. At front of each tab, provide routine maintenance documentation

for scheduled equipment. Include manufacturer's recommended maintenance schedule and highlight maintenance required to maintain warranty. Furnish list of routine maintenance parts, including part numbers, sizes, quantities, relevant to each piece of equipment: batteries, lamp lenses, speakers, and filters.

3) Include Warranty per Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements, and individual Sections.
4) Include product certificates of warranties and guarantees.
5) Include copy of complete parts list for equipment. Include available exploded views of assemblies and subassemblies.
6) Include copy of burn-in and test reports specific to each piece of equipment.
7) Include copy of software/appliance programming.
8) Include commissioning reports.
9) Engineer will return incomplete documentation without review. Engineer will provide one set of review comments in Submittal Review format. Contractor must arrange for additional reviews; Contractor to bear costs for additional reviews at Engineer's hourly rates.

b. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Submit copy of material used for Owner instruction. Field instruction per Section 27 00 00, Communications Basic Requirements Article titled "Demonstration."
c. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

15. Record Drawings:

a. Maintain at site at least one set of drawings for recording “as-constructed” conditions. Indicate on Drawings changes to original documents by referencing revision document, and include buried elements, location of conduit, and location of concealed communication items. Include items changed by field orders, supplemental instructions, and constructed conditions.
b. Record Drawings are to include equipment and connection schedules that accurately reflect "as constructed or installed" for project.
c. At completion of project, input changes to original project on CAD Drawings and make one set of black-line Drawings created from CAD Files in version/release equal to Contract Drawings. Submit CAD Files and Drawings upon substantial completion.
d. At completion of project, show changes and deviations from the Drawings in red on one set of black-line drawings. Include written Addenda, RFIs, and change order items. Make changes to Drawings in a neat, clean, and legible manner.
e. Invert elevations and dimensioned locations for incoming utilities and site raceways below grade extending to 5-feet outside building line.
f. See Division 27, Communications individual Sections for additional items to include in Record Drawings.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Work and materials installed to conform with all local, State and Federal codes, and other applicable laws and regulations. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.

B. Whenever this Specification calls for material, workmanship, arrangement, or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

C. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e., conduit) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.

D. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

E. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.

F. Provide products that are UL listed.

G. Contractor Qualifications:

1. Minimum of five years' experience in the design, installation, testing and maintenance of communications systems.
2. Must employ at least one full time BICSI certified Registered Communications Distribution Designer (RCDD) who is involved in reviewing work performed by contractor on this project.
3. Installation technicians must be BICSI certified for copper and fiber optic installations that are current and in good standing with BICSI. Provide roster of communications technicians and verifiable certifications for this project.
4. Maintain a local service facility which stocks spare devices and/or components for servicing systems.
5. Be able to provide project references for three projects, including scope of Work, project type, Owner/user contact name and telephone number.
6. The contractor selected for this project must be certified by the manufacturer of the approved products and utilize these components for completion of work.
7. Provide Manufacturer certifications for each respective technician that will be working on the project. All technicians must be manufacturer certified to install, terminate, and test horizontal and backbone cabling.

1.06 WARRANTY

A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements, and the General Conditions. Confirm requirements in all Contract Documents.

1.07 COORDINATION DOCUMENTS

A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, plumbing equipment/fixtures, fire sprinklers, plumbing, lights, cable trays and electrical services with architectural and structural requirements, and other trades (including ceiling suspension and tile systems), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.

B. Advise Architect in event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Architect of conflict.

C. Submit final Coordination Drawings with changes as Record Drawings at completion of Project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer, including but not limited to cable, outlets, patch panels, equipment connection cords and wall plates.

2.02 STANDARDS OF MATERIALS AND WORKMANSHIP

A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL listed and labeled or be approved by State, County, and City authorities prior to procurement and installation.

B. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

C. Hazardous Materials:

1. Comply with local, State of Washington, and Federal regulations relating to hazardous materials.
2. Comply with Division 00, Procurement and Contracting Requirements and Division 01, General Requirements for this project relating to hazardous materials.
3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner and Architect. Hazardous materials will be removed by Owner under separate contract.

PART 3 - EXECUTION

3.01 ACCESSIBILITY AND INSTALLATION

A. Confirm Accessibility and Installation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Install equipment requiring access (i.e., amplifiers, taps, zone controllers, volume controls, and storage devices) so that they may be serviced, reset, replaced, or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles, or crawlspaces which would impede or block intended usage.

C. Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Architect prior to proceeding with installation. This includes proper installation methods, sequencing and coordination with other trades and disciplines.

D. Earthwork:

1. Confirm Earthwork requirements in Contract Documents. In absence of specific requirements, comply with individual Division 27, Communications Sections, and the following:

    a. Perform excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with related earthwork divisions. Contact utilities and locate existing utilities prior to excavation. Repair any work damaged during excavation or backfilling.
    b. Excavation: Do not excavate under footings, foundation bases, or retaining walls.
    c. Provide protection of underground systems. Review the project Geotechnical Report for references to corrosive or deleterious soils which will reduce the performance or service life of underground systems materials.

E. Firestopping:

1. Confirm Firestopping requirements in Division 07, Thermal Insulation and Weather Barriers. In absence of specific requirements, comply with individual Division 27, Communications Sections, and the following:

a. Coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping, ductwork, and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

F. Plenums: In plenums, provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Architect/Engineer of discrepancy.

3.02 SEISMIC CONTROL

A. Confirm Seismic Control requirements in Division 01, General Requirements, Structural documents, and individual Division 27 Communications Sections.

B. General:

1. Earthquake resistant designs for Communications (Division 27) equipment and distribution, i.e. cabinets and racks, ceiling assemblies, raceways, ladder racking, etc. to conform to regulations of jurisdiction having authority.
2. Restraints which are used to prevent disruption of function of piece of equipment because of application of horizontal force to be such that forces are carried to frame of structure in such a way that frame will not be deflected when apparatus is attached to a mounting base and equipment pad, or to structure in normal way, utilizing attachments provided. Secure equipment and distribution systems to withstand a force in direction equal to value defined by jurisdiction having authority.
3. Provide stamped Shop Drawings from licensed Structural Engineer of seismic bracing and seismic movement assemblies for cabinets, racks, major equipment, and overhead raceways. Engineer to design and provide stamped Shop Drawings cabinets, racks, major equipment, and overhead raceway. Submit Shop Drawings along with equipment submittals.
4. Provide stamped Shop Drawings from licensed Structural Engineer of seismic flexible joints for piping and crossing building expansion or seismic joints. Submit Shop Drawings along with seismic bracing details.
5. Provide means to prohibit excessive motion of communications equipment during earthquake.

3.03 REVIEW AND OBSERVATION

A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Notify Architect, in writing, at following stages of construction so that they may, at their option, visit site for review and construction observation:

1. Underground conduit installation prior to backfilling.
2. Prior to ceiling cover/installation.
3. When main systems, or portions of, are being tested and ready for inspection by AHJ.

C. Final Punch: Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

3.04 CUTTING AND PATCHING

A. Confirm Cutting and Patching Requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections, and the following:

1. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural Engineer. Submit proposed locations to Architect/Project Structural Engineer. Where slabs are of post tension construction, perform x-ray scan of proposed penetration locations and submit scan results including proposed penetration locations to Project Structural Engineer/Architect for approval. Where slabs are of waffle type construction, show column cap extent and cell locations relative to proposed penetration(s).
2. Cutting, patching, and repairing for work specified in this Division including plastering, masonry work, concrete work, carpentry work, and painting included under this Section will be performed by skilled craftspeople of each respective trade in conformance with appropriate Division of Work.
3. Additional openings required in building construction to be made by drilling or cutting. Use of jack hammer is specifically prohibited. Patch openings in and through concrete and masonry with grout.
4. Restore new or existing work that is cut and/or damaged to original condition. Patch and repair specifically where existing items have been removed. This includes repairing and painting walls, ceilings, etc. where existing conduit and devices are removed as part of this project. Where alterations disturb lawns, paving, and walks, surfaces to be repaired, refinished and left in condition matching existing prior to commencement of work.
5. Additional work required by lack of proper coordination will be provided at no additional cost to the Owner.

3.05 EQUIPMENT SELECTION AND SERVICEABILITY

A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

3.06 DELIVERY, STORAGE AND HANDLING

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections, and the following:

1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt, and construction dust. Insulation and lining that becomes wet from improper storage and handling to be replaced before installation. Products and/or materials that become damaged due to water, dirt, and/or dust as a result of improper storage to be replaced before installation.

2. Protect all equipment and conduit to avoid damage. Close conduit openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

3.07 DEMONSTRATION

A. Confirm Demonstration requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Upon completion of work and adjustment of equipment and test systems, demonstrate to Owner's Authorized Representative, Architect and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

C. Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

3.08 CLEANING

A. Confirm Cleaning requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Upon completion of installation, thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout work, remove construction debris and surplus materials accumulated during work.

3.09 INSTALLATION

A. Confirm Installation requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Install equipment and devices in accordance with manufacturer's installation instructions, plumb and level and firmly secured to mounting surfaces. Maintain manufacturer's recommended clearances.

C. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test operation and demonstrate compliance with requirements. Replace damaged or malfunctioning equipment.

D. Provide miscellaneous supports/metals required for installation of equipment.

3.10 PAINTING

A. Confirm Painting requirements in Division 01, General Requirements and Division 09, Finishes. In absence of specific requirements, comply with individual Division 27, Communications Sections, and the following:

1. Ferrous Metal: After completion of communications work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces in telecommunications rooms, i.e., hangers, hanger rods, equipment stands, with one coat of black asphalt varnish for exterior or black enamel for interior, suitable for hot surfaces.
2. In a telecommunications room, on roof or other exposed areas, equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by Architect. Fire rated plywood backboards to receive two coats of fire retardant paint on all six sides; color to be white.
3. See individual equipment Specifications for other painting.
4. Structural Steel: Repair damage to structural steel finishes or finishes of other materials damaged by cutting, welding, or patching to match original.
5. Conduit: Clean, primer coat and paint interior conduit exposed in finished areas with two coats paint suitable for metallic surfaces. Color selected by Architect.
6. Covers: Covers such as handholes, maintenance holes, vaults, pullboxes and the like will be furnished with finishes which resist corrosion and rust. Covers are to be identified with ‘Communications.’ It is the Contractor's responsibility to proactively seek and obtain approval with Owner prior to purchasing and prior to installation for terms of satisfaction.

3.11 DEMOLITION

A. Confirm requirements in Division 01, General Requirements and Division 02, Existing Conditions. In absence of specific requirements, comply with individual Division 27, Communications Sections, and the following:

1. Scope:

    a. It is the intent of these documents to provide necessary information and adjustments to communications systems required to meet code and accommodate installation of new work.
    b. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas.
    c. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work. Compensate Owner for damages caused by failure to exactly locate and preserve underground utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.

2. Equipment: Unless otherwise directed, equipment, fixtures, or fittings being removed as part of demolition process are Owner's property. Remove other items not scheduled to be reused or relocated from job site as directed by Owner.
3. Unless specifically indicated on Drawings, remove exposed, unused raceways behind finished surfaces (floor, walls, ceilings, etc.). Cap raceways and patch surfaces to match surrounding finish.

4. Unless specifically indicated on Drawings, remove unused equipment, electrical boxes, fittings, and connectors. Removal is to be to a point behind finished surfaces (floors, walls, and ceilings).
5. Examination:

    a. Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to locate and preserve utilities. Replace damaged items with new material to match existing.
    b. Verify that abandoned wiring and equipment serve only abandoned facilities.
    c. Demolition Drawings are based on casual field observation and existing record documents.

        1) Verify accuracy of information shown prior to bidding and provide such labor and material as is necessary to accomplish work.
        2) Verify location and number of communications outlets, racks, panels, etc. in field.

    d. Report discrepancies to Architect before disturbing existing installation.

6. Promptly notify Owner if utilities are found which are not shown on Drawings.
7. Execution:

    a. Remove existing connectors, backboxes, wall plates and other communications equipment and devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition unless shown as retained or relocated on Drawings.
    b. Provide temporary wiring and connections to maintain communications continuity of existing systems during construction. Remove or relocate communications boxes, conduit, wiring, equipment, and the like, as encountered in removed or remodeled areas in existing construction affected by this work. In no event shall existing systems that are to remain operational, be diminished in any capacity by the demolition efforts.
    c. Remove and restore cable which serves usable existing outlets clear of construction or demolition.
    d. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing communications equipment which is being retained, provide new conduit and cable to bypass abandoned outlets.
    e. If existing conduits pass through partitions or ceiling which are being removed or remodeled, provide new conduit and cable to reroute clear of construction or demolition and maintain service to existing equipment. If these are conduits which require a new cable home run, e.g. telecom cable, request clarification from Architect or Engineer prior to proceeding with demolition.
    f. Extend cable slack and devices in existing walls to be furred out.
    g. Remove abandoned cable to point of origin and telecommunications room or any other room or space.
    h. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
    i. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

j. Disconnect and remove abandoned panelboards and distribution equipment.
k. Maintain access to existing communications installations which remain active. Modify installation or provide access panel as appropriate.
l. Existing communications outlets and devices are indicated on technology demolition plans. Verify exact location and number of existing communications outlets and devices in field. Only partial existing communications shown. Locations of items shown on Drawings as existing are partially based on Record and other Drawings which may contain errors. Verify accuracy of information shown prior to bidding and provide such labor and material as is necessary to accomplish intent of Contract Documents.
m. Remove abandoned cable to leave site clean.

B. Existing Communication Systems: Maintain existing systems in service until new system is complete and ready for service. Disable system only to make switchovers and connections.

1. Notify Owner at least five working days before partially or completely disabling system.
2. Make temporary connections to maintain service in areas adjacent to work area.

3.12 ACCEPTANCE

A. Confirm requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements. In absence of specific requirements, comply with individual Division 27, Communications Sections, and the following:

1. System cannot be considered for acceptance until work is completed and demonstrated to Architect that installation is in strict compliance with Specifications, Drawings, and manufacturer's installation instructions, particularly in reference to following:

a. Testing Reports, as outlined in their respective Division sections
b. Cleaning
c. Operation and Maintenance Manuals
d. Training of Operating Personnel
e. Record Drawings, including cabling identifications, symbols, and locations
f. Warranty and Guaranty Certificates, including extended manufacturer's warranties
g. Start-up/test Documents and Commissioning Reports

3.13 FIELD QUALITY CONTROL

A. Confirm Field Quality Control requirements in Division 00, Procurement and Contracting Requirements and Division 01, General Requirements, Section 27 00 00, Communications Basic Requirements and individual Division 27, Communications Sections.

B. Tests:

1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in Operation and Maintenance Manuals. All cabling test results are to be included.

2. During site evaluations by Architect or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

END OF SECTION

SECTION 271100 – COMMUNICATION EQUIPMENT ROOMS

PART 1 - GENERAL

1.01 SUMMARY

A. Telecommunications Backboards

B. Wall Mounted Equipment Racks

C. Cable Management Systems

1. Vertical Cable Managers
2. Horizontal Cable Managers

D. Telecommunications Grounding

1.02 RELATED SECTIONS

A. Contents of Division 27, Communications and Division 01, General Requirements apply to this Section.

1.03 REFERENCES AND STANDARDS

A. References and Standards as required by Section 270000, Communications Basic Requirements and Division 01, General Requirements.

B. Use this Section in conjunction with the other Division 27, Communications Sections and related Contract Documents to establish the total general requirements for the project technology systems and equipment.

1.04 SUBMITTALS

A. Submittals as required by Section 270000, Communications Basic Requirements and Division 01, General Requirements.

B. In addition, provide:

1. Shop Drawings that include, but are not limited to, the following: Telecommunication Room layout, Telecommunication Room wall elevations, equipment rack elevations, cable routing, cable connecting diagrams, termination pin outs, supporting hardware details, block diagrams, riser diagrams and cable pathways. Work may not begin until shop drawings are approved. Note: Intent of submitting shop drawings is for contractors to display a conceptual understanding of the issued Engineer drawings. Do not submit Engineer Drawings on your title block.

2. Procedures for cable labeling and identification, long term documentation methods and numbering scheme in accordance with ANSI/TIA-606-C.
3. A copy of certified installer certificates and warranty certificates for products proposed.

1.05 QUALITY ASSURANCE

A. Quality assurance as required by Section 270000, Communications Basic Requirements and Division 01, General Requirements.

1.06 WARRANTY

A. Warranty of materials and workmanship as required by Section 270000, Communications Basic Requirements and Division 01, General Requirements.

1.07 SYSTEM DESCRIPTION

A. The communications room distribution subsystem refers to the passive components used to terminate cabling subsystems and distribute technology services. This subsystem includes but is not limited to installations in the Main Telecommunications Room (MTR), Telecommunications Rooms (TR) and Entrance Facility (EF), and Main Port of Entry (MPOE).

B. The telecommunications rooms and spaces are intended to house racks, cabinets, and equipment necessary for the support of the information and communications technology (ICT) cabling infrastructure as well as other low-voltage systems.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. See Products listed below

2.02 TELECOMMUNICATIONS BACKBOARDS:

A. 3/4-inch thick, 48-inches wide by 96-inches long, A/C grade or better, void-free plywood, fire treated backboard.

1. Void-free ‘A’ side, is the exposed side with fire rating stamp exposed

B. Mounted +18-inch above finished floor

C. Butt against one another on all walls including over door header

D. Painted white, with two coats of fire retardant paint on all six sides

E. Leave fire rating stamp exposed on each piece of plywood for AHJ to observe.

2.03 WALL MOUNT EQUIPMENT RACKS:

A. 24-inches high, 24-inches deep, 24-inches wide, wall mounted cabinet with solid hinged door.

B. Chatsworth Products, Inc. EasySwing Wall Mount Rack

1. Model 13604-X25

a. 19U, 25-inch Deep – 38.5-inch H x 20.3-inch W x 25-inch D
b. Rated to 85 lbs

C. Chatsworth Products, Inc Standard Swing Gate OPM-0263-13

1. Model 11791-725

a. 20U, 25-inch Deep – 43-inch H x 21.7-inch W x 25.2-inch D
b. Rated to 150 lbs

D. Chatsworth Products, Inc, Fixed Wall Mount Equipment Rack

1. Model 11961-X18

a. 20U, 18-inch Deep – 41.4-inch H x 22.4-inch W x 18.6-inch D
b. Rated to 200 lbs.

E. Chatsworth Products, Inc, Heavy Duty Wall Mount Equipment Rack

1. Model 15320-X24

a. 20U, 24-inch Deep – 41.2-inch H x 23-inch W x 24-inch Deep
b. Rated to 350 lbs.

F. B-Line Swing Gate Wall Mount Equipment Rack

1. Model SB708194425

a. 21U, 25-inch Deep – 43 3/16-inch H x 19.88-inch W x 25-inch D
b. Rated to 150 lbs.

G. B-Line Heavy Duty Wall Mount Equipment Rack

1. Model SB704193930

a. 22U, 30-inch Deep – 39.5-inch H x 20.5-inch W x 30-inch Deep
b. Rated to 350 lbs

H. Or approved equivalent.

2.04 CABLE MANAGEMENT SYSTEMS:

A. Cable management systems for both vertical and horizontal cable management, shall be by one manufacturer. Final color shall be approved by Owner prior to purchase and installation.

B. Vertical Cable Managers

1. 7-feet Tall, 6-inch Wide, dual sided, with separators, spools, and dual hinged doors on front and rear.:

a. Chatsworth Products, Inc, Motive;

1) Model 32620-X03 (7 Black, E White)
2) Bend radius for Fiber Patch Cords

(a) 32697-001 (Pack of 10)

b. Chatsworth Products, Inc Evolution g2

1) Model 35521-X03
2) Bend radius for Fiber Patch Cords

(a) 32697-001 (Pack of 10)

c. B-Line, RCM+('XX' = FB, SL, EW)

1) Model SB86086D084XX

d. Panduit;

1) Patch Runner 2 Model PR2VD06.
2) Patch Runner 2 Enhanced Model: PE2VD06

e. Or approved equivalent.

2. 7-feet Tall, 8-inches Wide, with separators, spools, and dual hinged doors on front and rear.

a. Chatsworth, Motive

1) Model 32621-X03 (7 Black, E White)
2) Bend radius for Fiber Patch Cords

(a) 32697-001 (Pack of 10)

b. Chatsworth Products, Inc Evolution g2

1) Model 35522-X03
2) Bend radius for Fiber Patch Cords

(a) 32697-001 (Pack of 10)

c. Panduit

1) Patch Runner 2 Model PR2VD08
2) Patch Runner 2 Enhanced Model: PE2VD08

d. Or approved equivalent.

3. 7-feet Tall, 10-inches Wide, with separators, spools, and dual hinged doors on front and rear.

a. Chatsworth Products, Inc Motive

1) Model 32622-X03 (7 Black, E White)
2) Bend radius for Fiber Patch Cords

(a) 326977-001 (Pack of 10)

b. Chatsworth Products, Inc Evolution g2

1) Model 35523-X03
2) Bend radius for Fiber Patch Cords

(a) 32697-001 (Pack of 10)

c. B-Line, RCM+ ('XX' = FB, SL, EW)

1) Model SB860810D084XX

d. Panduit

1) Patch Runner 2 Model: PR2VFD10
2) Patch Runner 2 Enhanced Model : PE2VD10

e. Or approved equivalent.

4. 7-feet Tall, 12-inches Wide, with separators, spools, and dual hinged doors on front and rear.

a. Chatsworth Products, Inc Motive

1) Model 32623-X03 (7 Black E White)
2) Bend radius for Fiber Patch Cords

(a) 32697-001 (Pack of 10)

b. Chatsworth Products, Inc Evolution g2

1) Model 35524-X03
2) Bend radius for Fiber Patch Cords

(a) 32697-001 (Pack of 10)

c. B-Line, RCM+ ('XX' = FB, SL, EW)

1) Model SB860812D084XX

d. Panduit

1) Patch Runner 2 Model: PR2VD12
2) Patch Runner 2 Enhanced Model: PE2VD12

e. Or approved equivalent.

5. 7-feet Tall, 15-inches Wide, with separators, spools, and dual hinged doors on front and rear.

a. Chatsworth Products, Inc Motive

1) Model 32624-X03 (7 Black E White)
2) Bend radius for Fiber Patch Cords

(a) 32697-001 (Pack of 10)

b. Chatsworth Products, Inc Evolution g2

1) Model 35525-X03
2) Bend radius for Fiber Patch Cords

(a) 32697-001 (Pack of 10)

c. Or approved equivalent.

C. Horizontal Cable Managers:

1. 19-inches wide:

a. Chatsworth Products, Inc.

1) Motive, with pass through ports

(a) 1RU Motive Model :35432-X01 – No pass through ports
(b) 2RU Motive Model :35431-X02
(c) 3RU Motive Model :35431-X03
(d) 4RU Motive Model :35431-X04

2) Evolution, with pass through ports (7=Black; E= White)

(a) 1RU Motive Model :35441-X01 – No pass through ports
(b) 2RU Motive Model :35441-702
(c) 3RU Motive Model :35441-703
(d) 4RU Motive Model :35441-704

3) Jumper Trough

(a) 2RU Upper Tray, 3.5-inch Deep: 12183-X19
(b) 2RU Upper Tray, 6-inch Deep: 13183-X19
(c) 2RU Lower Tray, Single, 3.5-inch Deep: 12185-X19
(d) 3RU Lower Tray, Double, 3.5-inch Deep: 12187-X19
(e) Transition Plate, 15.5-inch L: 12186-X01

4) Large Horizontal Rings 19-inch, 2.8-inch H, 6-inch Deep, Heavy Duty Aluminum, Rounded Edges

(a) 11564-X19

b. B-Line

1) RCM+ Rack Mount Horizontal Cable Manager ('XX' is finish – FB Black, SL Silver, EW Eaton White)

(a) 1RU Model: SB87019SX1XX
(b) 2RU Model: SB87019SX2XX
(c) 3RU Model: SB87019SX3XX
(d) 4RU Model: SB87019SX4XX

2) Jumper Troughs ('XX' is finish – FB Black, SL Silver)

(a) 1RU Top Transition Tray, 3.5-inch Deep: SB81319TT3XX
(b) 1RU Upper Transition Tray, 3.5-inch Deep: SB1319UT3XX
(c) 1RU Lower Transition Tray, 3.5-inch Deep: SB1319LT3XX
(d) 2RU Lower Tray, Double, 3.5-inch Deep: SB1319LTD3XX
(e) Transition Tray, 3.25" Deep, 15.8-inch L: SB813TP3XX

3) Large Horizontal Rings 19-inch, 3-inch H, 3.5-inch Deep ('XX' is finish – FB Black, EW Eaton White, TG Gray)

(a) Model: SB719192XLXX

c. Panduit

1) Patch Runner 2 Horizontal

(a) 2RU Model: PR2HF2
(b) 3RU Model: PR2HF3
(c) 4RU Model: PR2HF4

2) Net Manager Horizontal

(a) 1RU Model: NMF1
(b) 2RU Model: NMFH2
(c) 3RU Model: NMF3
(d) 4RU Model: NMF4

3) Large Horizontal Rings 19-inch, 3.47-inch H, 5.67-inch Deep

(a) CMPHH2

d. Or approved equivalent.

2.05 TELECOMMUNICATIONS GROUNDING:

A. All bonding and grounding conductors shall have two-hole, double irreversible type connector lugs.

B. Telecommunications Main Grounding Primary Busbar (PBB), UL Listed, 20-inch L x 4-inch W x 1/4-inch

1. Chatsworth Products, Inc

a. Model 40153-020

2. B-Line

a. Model SBTMGB20K

3. Or approved equivalent.

C. Telecommunications Grounding Secondary Busbar (SBB), UL Listed, 12-inch L x 4-inch W x 1/4-inch

1. Chatsworth Products, Inc

a. Model 40153-012

2. B-Line

a. Model SBTMGB12K

3. Or approved equivalent.

D. Vertical Rack Bonding Busbar (RBB), 72-inches

1. 1/4-20 tapped mounting holes on 5/8-inch centers
2. Insulators and lug kits
3. 5/16-inch self-clinching studs on 1-inch centers at both ends for attachment of bonding conductor

a. Chatsworth Products, Inc

1) Part Number:40172-001 (Kit)

E. Telecommunications Ground Accessories:

1. One Hole Ground Terminal Block:

a. Chatsworth Products, Inc

1) Model 08009-001

b. B-Line
c. Or approved equivalent.

2. Two Hole Ground Terminal Block:

a. Chatsworth Products, Inc

1) Model 40167-001

b. B-Line
c. Or approved equivalent.

3. Two Hole Grounding Lug:

a. Chatsworth
b. B-Line
c. Or approved equivalent.

4. Cable Runway Ground Strap Kit:

a. Chatsworth

1) Model 401-64-001

b. B-Line Ground Strap

1) Model SB6691X73/4

c. Or approved equivalent.

F. Primary Busbar (PBB):

1. Solid copper busbar kit, 20-inches long, 4-inches wide, 1/4-inch thick, wall mounted with standoffs.
2. BICSI/ANSI/TIA Standards compliant
3. Two-hole lug pattern per ANSI/BICSI N3-20 and ANSI-TIA-607 Standards
4. Two-hole lugs with double irreversible crimp for all busbar connections
5. Two insulators
6. Two stand-off brackets
7. Four, stainless steel bolts with Torx T-45 head
8. UL Listed
9. #6 AWG lugs are two-hole with 1/4-inch hardware
10. #2, 2/0 and 4/0 lugs are two-hole lugs with 3/8-inch hardware

a. Manufacturer:

1) Chatsworth Products, Inc

(a) Part Number 40153-020

2) Or equivalent

G. Secondary Busbar (SBB):

1. Solid copper busbar kit, 12-inches long, 4-inches wide, 1/4-inch thick, wall-mounted with standoffs.
2. BICSI/ANSI/TIA Standards compliant
3. Two-hole lug pattern per ANSI/BICSI N3-20 and ANSI-TIA-607 Standards
4. Two-hole lugs with double irreversible crimp for all busbar connections
5. Two insulators
6. Two stand-off brackets
7. Four, stainless steel bolts with Torx T-45 head
8. UL Listed
9. #6 AWG lugs are two-hole with 1/4 inch hardware
10. #2, 2/0 and 4/0 lugs are two-hole lugs with 3/8" hardware

a. Manufacturer:

1) Chatsworth Products, Inc

(a) Part Number 40153-012

2) Or equivalent

H. Rack Bonding Busbar

1. Horizontal Rack Bonding Busbar (RBB)

a. 19-inch long, 3/16-inch thick, 3/4-inch wide Copper Busbar
b. Manufacturer:

1) Chatsworth Products, Inc

(a) Part Number 10610-019

2) B-Line
3) Or equivalent

2. Vertical Rack Bonding Busbar (RBB)

a. 36-inch Long, 5/8-inch wide, 1/4-inch thick, 310-E Universal hole pattern, Kit
b. UL Listed
c. #1/4-20 tapped mounting holes on 5/8-inch centers
d. One set of 5/16-inch self-cinching studs on 1-inch centers at one end for attachment of bonding conductor.
e. Manufacturer:

1) Chatsworth Products, Inc

(a) Part Number: 40161-036

2) Or equivalent

f. 78.65-inch Long, .68-inch wide, 1/4-inch thick, 310-E Universal hole pattern, Kit
g. UL Listed
h. #1/4-20 tapped mounting holes on 5/8-inch centers
i. Two sets of 5/16-inch self-cinching studs on 1-inch centers at both ends for attachment of bonding conductors.
j. Manufacturer:

1) Chatsworth Products, Inc:

(a) Part Number 40161-072

2) Or equivalent

3. Rack Bonding Jumper Kit

a. 9-inch Length, #6 AWG stranded copper conductor, green insulated jacket with a yellow stripe attached to a two-hole, dual compression irreversible crimp lug with 1/4-inch bolt holes spaced on 5/8-inch centers.
b. 1/4-20 zinc plated serrated flange hex nuts
c. Manufacturer:

1) Chatsworth Products, Inc:

(a) Part Number: 40159-008, 1 each
(b) Part Number: 40159-018, pack of (10)

2) Or equivalent

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Provide all components of the telecommunications system from a single manufacturer to the greatest extent possible to provide manufacturer warranty.

1. Cable, patch panel, face plates, inserts, and patch cords
2. Racks and Cabinets
3. Horizontal and Vertical Cable Management
4. Grounding and Bonding

a. All grounding and bonding connections shall be made conductive with the incorporated use of removing paint to contact bare metal in contact with the bonding components and using the anti-corrosive and anti-oxidizing gel on all exposed conductive locations.

1) Paint scrape removal
2) Lug terminations

3) Bonding points for equipment and grounding conductors
4) Racks, Cabinets
5) Overhead cable runways and basket trays
6) Static dissipative flooring

B. Make floor penetrations pathways, at least three-inches and no more than 4-inches from wall. Install conduit stubs to extend three-inches to four-inches above floor. Cap and seal conduits for protection, utilize plastic protective bushings for installed cabling conditions. Bond to grounding system.

1. Where floor penetrations require both F and T ratings, fire wrap and/or fire blanket kits must be installed.

C. Fire rated assemblies shall be utilized for these spaces that continue the integrity of each room/space. 4-inch EZ-Path is the horizontal approved pathways.

D. Seismic installations require additional bracing of cabinets and overhead cable runways and basket tray to building structure, as advised by and certified by a licensed structural engineer and manufacturer OPS's/OPA's/OPD's.

E. Labeling:

1. Label telecom rooms with the numerical floor level and sequential space identifier alphanumerically. Example:

a. The first TR on floor 1 is labeled as '1A'
b. The second for the same floor is '1B', etc.

2. Label racks with the equipment room number and a unique two-digit identifier beginning with the telecom room rack/cabinet number and the number one, i.e. TR1-1. in sequence.

a. First rack or cabinet in the room is labeled as ‘01’Two-Way DASCXCC
b. Subsequent racks or cabinets are 02, 03, 04, etc.

3. Label the first patch panel in each rack/cabinet with a unique two digit identifier beginning with ‘01’.

a. Each subsequent patch panel shall be 02, 03, 04, 05 etc.
b. Locate label in the center of patch panels

1) White on Black, 1/2-inch font, machine generated peel and stick labels, for black colored patch panels
2) Black on White, 1/2-inch font, machine generated peel and stick labels, for white colored patch panels

4. Label each cable terminating in a patch panel with its respective two-digit port number (numbering range: 01-48)
5. Label the telecommunications grounding busbar and bonding conductor with the equipment room number and a unique identifier, beginning with the number one, i.e. PBB. The designation for the Telecommunications Main Ground Busbar begins with PBB. The designation for the secondary busbars is (SBB).

6. Submit labeling schemes to the Telecom Consultant for approval prior to testing and labeling.

3.02 TELECOMMUNICATIONS BACKBOARDS

A. Mount plywood backboard vertically, 8-inches from floor, on all walls covered within each telecommunications space, as indicated on drawings.

B. Mount backboards with the smooth "A" surface facing away from the wall. Paint the backboard with two coats of white, fire resistant paint on all six sides, prior to mounting. Leave fire rated stamp exposed on each piece for AHJ to observe.

C. Install boards plumb, level and secured to studs, wall backing, solid concrete or masonry walls. Use a minimum of six appropriate fasteners for every 16 SF of backboard.

1. Anchors for attaching equipment boards include:

a. Material/Substrate: Anchor type.
b. Concrete/Masonry: Expansion anchors; wedge type with washer located on the backside of the board.
c. Gypsum Wallboard: Togglebolts; use pan head type.

D. Powder drive anchors, molly bolts and tappets are not allowed.

3.03 WALL MOUNTED EQUIPMENT RACKS

A. Position equipment racks according to drawings with a minimum of 3-feet of clearance in front. Field verify the dimensions of the room prior to installation of racks and report any discrepancies and challenges to the Owner.

B. Bolt vertical cable managers for equipment racks to the side of the rack using manufacturer's recommended hardware.

C. Provide the required seismic bracing for racks per AHJ.

D. Provide proper seismic bracing and wire management from backboard to freestanding equipment rack, per AHJ.

3.04 VERTICAL CABLE MANAGERS

A. Reference 3.01, General Installation Requirements.

B. Install per manufacturer's instructions and recommendations.

C. Bolt vertical wire managers for free-standing and 4-post equipment racks to the side of the rack using manufacturer's recommended hardware.

D. Size accordingly to not over fill or store excessive amount of slack in cable managers.

3.05 HORIZONTAL CABLE MANAGERS

A. Reference 3.01, General Installation Requirements.

B. Install per manufacturer's instructions and recommendations, Owner standards including rack elevations and project specifications.

C. Size accordingly to not over fill or store excessive amount of slack in cable managers.

3.06 TELECOMMUNICATIONS GROUNDING

A. Bond equipment racks and cable runway and basket tray to each equipment room PBB/SBB (one per equipment room minimum) with #6 AWG or larger, stranded copper conductor.

B. Connect each PBB to the SBB and using the NEC code required bonding conductor based upon distance. Bonding conductor minimum size is a #6 AWG or larger, stranded copper conductor

C. Connect PBB and SBB to the Telecommunications Room busbar located in these spaces. Bond each Rack, Cabinet overhead runway, basket tray, vertical runway and basket tray, conduit sleeves including EZ-Path fire rated pathways. Bond all vertical through floor and all horizontal through wall, conduits and sleeves, including EZ-Path

D. Two hole, double irreversible crimp type lugs with window are required on all ground bonding cables connecting to the PBB and SBB.

END OF SECTION

SECTION 311000 – SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation
3. Removing invasive species
4. Topsoil stripping and stockpiling
5. Disposal of material from clearing, grubbing, thinning and demolition in approved off-site disposal areas.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 024120 –Site Demolition and Relocation
2. Section 312000 – Site Earthwork
3. Section 312500 – Erosion and Sedimentation Control

1.3 RELATED DOCUMENTS

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

B. All site clearing work shall be in accordance with the Washington State Department of Transportation and American Public Works Association WSDOT/APWA Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, Current Edition, Section 2-01, and other sections as specified or applicable.

C. WSDOT/APWA Standard Plans for Road, Bridge and Municipal Construction, Current Edition.

1.4 MATERIAL OWNERSHIP

A. Except for materials indicated to be relocated, or to be hauled and stockpiled to the Owner’s property, cleared materials shall become Contractor's property and shall be removed and legally disposed of at the Contractor’s expense.

B. When possible, the Contractor should re-use or sell materials generated by Site Clearing such as timber, firewood, or wood chips.

1.5 SUBMITTALS

A. Photograph or otherwise record in sufficient detail existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

B. The Contractor shall submit the following information to the Contracting Officer for review before commencing work:

1. Site Plan: Showing vegetation removal limits and areas for temporary construction and field offices.
2. Permits for transport and disposal of debris.
3. Demolition procedures and operational sequence.

1.6 QUALITY ASSURANCE

A. Preconstruction Conference: Conduct conference at Project site prior to clearing operation.

1.7 PROJECT CONDITIONS

A. 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 waiving jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways.

B. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated by Owner.

C. Notify utility locator service for mark-out to be done before site clearing.

1.8 1.07 MISCELLANEOUS TREE REMOVAL

A. If during construction it is determined that trees and shrubs outside of designated clearing areas are to be removed, the Contractor shall first notify and coordinate with Owner’s representative prior to any such removal.

B. The Contractor, together with the Owner and a representative from the project landscape architecture team, shall jointly consult with a professional arborist as necessary to determine specific tree preservation measures for trees identified to be preserved at locations where work will occur within the dripline of the tree canopy or within near proximity to the tree. Prior to beginning such work, fencing shall be at least three feet high, plastic and highly visible, and shall be located at the dripline of existing trees to be retained. Such consultation will also take place to specifically identify potential health problems or blow-down risks that may be associated with trees to be preserved. No trees located outside of designated clearing areas shall be removed without the permission of the Owner’s representative.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Notify utility locator service for mark-out to be done before site clearing.

C. Install erosion-control measures prior to start of any other construction to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and roadways.

D. The boundaries of the clearing limits shall be clearly flagged and approved by the Owner prior to construction.

E. Locate and clearly flag trees and vegetation to remain. Install high visibility fence for tree protection. Tree protection fence as shown on the plans is intended to denote the location of the fence where it will not obstruct the entire work and is the minimum area to be protected. The Contractor shall install the fence over the largest area of the Critical Root Zone (CRZ) as possible for the type of work currently under way, and only reduce the area as needed and as approved by the Owner. The CRZ is defined as the area within a circle whose radius is twelve times the diameter of the tree. E.g. the CRZ for a 30-inch diameter tree has a radius of 30 feet.

F. Protect existing site improvements and utilities to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation within grading limits to permit installation of new construction. Remove trees designated for removal outside grading limits.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Prune minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction under the field direction of the project landscape architect.
3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
4. Use only hand methods for grubbing within drip line of remaining trees.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place fill material in horizontal layers not exceeding 8-inch in loose depth and compact each layer to a density equal to adjacent original ground.

1. Place fill material in horizontal layers not exceeding 8-inch in loose depth, and compact each layer to a density equal to adjacent original ground.

3.3 TOPSOIL REMOVAL

A. Strip topsoil to depths encountered.

1. Stop topsoil stripping at dripline of trees not designated for removal to prevent damage to main root system.
2. Separate from underlying subsoil or objectionable material.
   Stockpile topsoil for subsequent reuse.
3. Construct storage piles to freely drain surface water.
4. Seed or cover storage piles to prevent erosion.

3.4 DISPOSAL

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. No burning of any material will be allowed.

END OF SECTION

SECTION 312000 – SITE EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Preparing subgrades for roadway, parking areas, walkways, pavements, and plantings.
2. Subbase and base course for hot-mix asphalt and cement concrete paving.
3. Subsurface drainage backfill for walls or building foundation.
4. Excavating and backfilling for utility trenches.
5. Reuse of soils.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 024120 – Site Demolition and Relocations
2. Section 311000 – Site Clearing
3. Section 312500 – Erosion and Sedimentation Control

1.3 RELATED DOCUMENTS

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

B. Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for road, Bridge, and Municipal Construction, Current Edition, Sections 2-03, 2-09, 4-04, and other sections as specified or applicable.

1.4 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course and cement concrete or hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by the Project Representative. Unauthorized excavation, as well as remedial work directed by Owner, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that exceed a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm) when tested by an independent geotechnical testing agency, according to ASTM D 1586.

H. Structures: Buildings, footings, foundations, retaining walls, curbs, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables.

L. Controlled Density Fill: A self compacting, cementitious, flowable material requiring no subsequent vibration or tamping to achieve consolidation.

M. Earthwork Terminology: Terms used in this Section and not defined herein shall be interpreted in accordance with the definitions given in ASTM D653.

N. Embankment: Soil or soil-rock material placed to raise the subgrade or natural grade of the site for embankment construction.

O. Structural Fill: Clean, crushed, granular material used to create embankments that will support structures. Structural fill material will be material that is considered an all weather fill material.

P. All Weather Fill Material: Imported material that has minimal fines, is free draining, and can be placed, shaped, and compacted using normal compaction methods during most wet weather with minimal pumping and shoving.

Q. Unsuitable Material: Excavated material or material below the natural ground surface in embankment areas or below subgrade elevation in excavated areas, which is unsuitable for its planned use as determined by the Project Representative. Unsuitable material is further defined as material determined to be:

1. Of such unstable nature as to be incapable of being compacted to specified density using ordinary methods at optimum moisture content.
2. Too wet to be properly compacted and circumstances prevent suitable in-place drying prior to incorporation into the Work.
3. Not meeting requirements specified in Part 2 of this Section.
4. Otherwise unsuitable for the planned use.
5. The presence of excessive moisture in a material is not, by itself, sufficient cause for determining that the material is unsuitable.

U. Relative Compaction: The ratio, expressed as a percentage, of the in-place dry density of fill materials as compacted in the field to the maximum dry density of the same material as determined by WSDOT Test Method No. 606.

V. Optimum Moisture Content: The water content at which a soil can be compacted to a maximum dry unit weight by a given compactive effort.

W. Well-graded: Well-graded is a specific geotechnical term used to assure that material not only meets specific percent-passing numerical values, but also intent. It is defined by ASTM D 2487.

1.5 SUBMITTALS

A. Test Reports: Submit certified test reports of all tests specified to be performed. Test reports shall be signed and sealed by a geotechnical engineer registered in the State of Washington.

B. Delivery Tickets: Submit a delivery ticket with each load of imported embankment material delivered to the site, stating the type of fill material and the quantity.

C. Product Data: For the following:

1. All aggregates proposed for use.
2. Import fill.

D. Samples: Furnish and deliver samples of fill and backfill materials as selected by the Owner's Representative for testing and analysis.

E. 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 and borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 1557 for each on-site and borrow soil material proposed for fill and backfill.

F. Pre-excavation Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

G. Shoring Design: Where shoring (using other than pre-engineered systems) is determined by the Contractor to be necessary, submit proposed excavation shoring method for review at least two

weeks prior to commencement of excavation requiring shoring. Submit, all at one time, in a neat orderly form, the following information:

1. Basic design assumptions.
2. Design calculations.
3. The shop drawings to which the shoring system shall be constructed.
4. Certification of the above by a registered professional civil or structural engineer licensed by the State of Washington.

1.6 QUALITY ASSURANCE

A. Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “General Requirements.”

B. 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.

C. If test indicates material does not meet specification requirements, provide corrective measures and retest as necessary to conform to the contract documents.

D. Tolerances:

1. Construct finished subgrades to plus 0 or minus 1/2-inch of the elevations indicated.
2. Construct finished grade of slopes not steeper than 3:1 plus or minus 1/2 inch and on slopes steeper than 3:1 plus or minus two inches (2″).
3. Maintain the moisture content of fill material as it is being placed within plus or minus 2% of the optimum moisture content of the material as determined by the laboratory tests herein specified.

1.7 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner’s written permission.
3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

C. Unfavorable Weather Conditions:

1. Excavating, filling, backfilling, and grading work shall not be performed during weather conditions that might damage or be detrimental to the condition of existing ground, in-progress work, or completed work. When the Work is interrupted by rain, freezing weather, or other conditions deemed unsuitable by the Project Representative,

excavating, filling, backfilling, and grading work shall not resume until the site and soil condition (moisture content) are suitable for compaction.

2. Subgrade shall be free from mud, snow, ice, and deleterious material when work is resumed.
3. Soil material that is too wet for compaction shall be left to drain, to be aerated and dried by disking and harrowing or other approved method until the moisture content of the area is uniform and within the specified limits.

D. Erosion Prevention: Protect stockpiles, ditches, embankments, filled, backfilled, and graded areas to prevent erosion until such time as permanent drainage and erosion control measures have been installed per the requirements of Section 015713 – Temporary Erosion and Sediment Control.

E. Control of Dust: Employ construction methods and means that keep flying dust to the minimum throughout the entire Contract period. It may include watering and sprinkling, or other approved methods at the construction site of such frequency that will satisfactorily control the dust caused by construction operations.

F. Control of Dirt: Provide for prompt removal from existing roadways of all dirt and other materials that have been spilled, washed, tracked, or otherwise deposited thereon by construction operations whenever the accumulation is sufficient to cause the formation of mud, interfere with drainage, damage pavements, or create a traffic hazard.

G. Indicated locations of existing facilities and systems are approximate. Investigate and determine exact location and nature of utilities, facilities, and systems, and be solely responsible for damages caused by construction activities.

H. Excavation in areas that have or may have underground facilities:

1. Delineate with white paint, flags, or other methods the area to be excavated and contact Underground Location Service to request that facility owners mark the location of underground utilities.
2. Identify temporary survey markings using PINK colored markings in accordance with Underground Service alert requirements.
3. Facility owners will field mark approximate location and number of subsurface installations affected by excavation using the following colors:

    a. Safety RED – Electric power, distribution, and transmission installations, or municipal electric installations.
    b. High Visibility Safety YELLOW – Gas distribution and transmission installations, oil distribution and transmission installations containing or transporting dangerous materials, products, or steam.
    c. Safety Alert ORANGE – Telephone and telegraph installations, police and fire communication installations, and cable television installations.
    d. Safety Precaution BLUE – Water installations and slurry pipelines.
    e. Safety GREEN – Sewer installations.
    f. Do not use above listed colors for Contractor’s temporary markings suck as survey points; use U.S.A. designated PINK color.

PART 2 - PRODUCTS

2.1 GENERAL

A. Material used for fill, backfill, and embankment construction shall be an inert, nonexpansive soil, free from organic matter and other deleterious substances and of such quality that it will compact thoroughly without the presence of voids when watered and rolled. Excavated on-site material will be considered suitable for fill, backfill, and embankment construction if it is free from organic matter and other deleterious substances and conforms to the requirements specified herein.

B. Excavated material that is suitable for fill, backfill, and embankment construction shall be conditioned for reuse. Rocks exceeding four inches (4″) in largest dimension and deleterious material shall be removed from the site and disposed of as specified herein under Disposal of Surplus Material.

2.2 SOIL MATERIALS

A. Embankment: All embankment material shall be granular in nature and shall conform to Section 9-03.14(1).

B. Wall Backfill: Shall consist of free-draining material conforming to WSDOT/APWA Section 9-03-12(2).

C. Trench Backfill for Utilities and Utility Structures: Shall be well-graded granular material with a maximum particle size of 1.5 inches, have less than 10 percent by weight passing the US standard No. 200 sieve, free from organic matter and conforming to WSDOT/APWA Section 9-03.10 Gravel Backfill, or 9-03.19 Bank Run Gravel for Trench Backfill. Recycled fill material not allowed.

D. Pipe Bedding Material: Shall consist of free-draining material conforming to WSDOT/APWA Section 9.03.12(3). Recycled fill material not allowed.

E. Controlled Density Fill: Shall conform to WSDOT/APWA Section 2-09.3(1)E.

F. Gravel Backfill for Drains: Shall conform to WSDOT/APWA Section 9-03.12(4).

G. Base Course: Shall conform to WSDOT/APWA Section 9-03.9(3), Base Course with exception that the aggregate should have less than 5 percent passing US Standard No. 200 Sieve.

H. Top Course: Shall conform to WSDOT/APWA Section 9-03.9(3), Top Course with exception that the aggregate should have less than 5 percent passing US Standard No. 200 Sieve.

I. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

K. Quarry Spalls: Shall conform to WSDOT/APWA Section 9-13.1(5).

L. Imported Granular Fill: Shall include select borrow or gravel borrow meeting the requirements of WSDOT/APWA Section 9-03.14(2) and 9-03.14(1), respectively, with the exception that the amount passing the No. 200 sieve be 7 percent or less.

M. Topsoil: Existing Topsoil shall be retained from existing planting areas to the maximum extent practicable. Imported Topsoil may be used to supplement Existing Topsoil as needed. Imported Topsoil shall meet the requirements in Specs Section 32 93 00.

2.3 GEOTEXTILES

A. Geotextile for underground drainage shall conform to WSDOT/APWA Section 9-33.

B. Geotextile for separation or soil stabilization shall conform to WSDOT/APWA Section 9-33.

2.4 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) 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 (750 mm) 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 PREPARATION

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, and obstructions, from ground surface is specified in Division 31 Section “Site Clearing.”

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section “Erosion and Sedimentation Control,” during earthwork operations.

D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

E. Before placement of any fill, subgrade shall be inspected by the geotechnical engineer to identify soft, yielding, or unsuitable soils.

3.2 STAKING AND GRADES

A. Layout the work, establish all necessary markers, benchmarks, grading stakes, and other stakes as required, in accordance with the lines and grades of the Plans.

B. Perform field surveys to include the following:

1. Final surveys when excavations, backfills, and embankments are completed.

3.3 UTILITIES

A. Verify on site the location and depth (elevation) of all existing utilities and services before performing any excavation work. Use the one call (811) utility service and other means required to verify locations.

B. Abandoned sewers, piping, and other utilities encountered during excavation shall be removed and the ends plugged with CDF concrete, or the entire pipe may be grouted full with CDF.

C. Active utility lines encountered, which are not indicated in the Contract Documents, shall be reported immediately to the Contracting Officer and utility owners involved. The Contracting Officer and utility authorities shall be permitted free access to determine the measures deemed necessary to repair, relocate, or remove the utility.

D. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent.

3.4 EARTHWORK GENERAL REQUIREMENTS

A. Erosion Protection: Prevent erosion of the site and turbidity in adjacent waterbodies of the site at all times. Conform to all the requirements as per Section 312500 – Erosion and Sedimentation Control.

B. Construction Traffic: Disperse travel paths of traffic and construction equipment over entire width of compacted surfaces so as to aid in obtaining uniform compaction. Protect exposed soil layers with high moisture content from excessive wheel loads.

C. On-Site Excavation:

1. Do not excavate or remove any material from the project site or right-of-way which is not within the designated excavation.

D. Disposal of Surplus Material:

1. Excess earth materials, unsuitable materials, and debris shall become the property of the Contractor and shall be removed from the site and disposed of in a legal manner. The Contractor is to provide the Contracting Officer with copies of the documentation for the legal disposal of materials.
2. Location of disposal site and length of haul shall be the Contractor's responsibility.

E. Maintenance of Excavations, Slopes, and Embankments:

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Maintain slops and embankments until final completion and acceptance of the Work. Promptly repair slides, slipouts, washouts, settlements, and subsidence that occur for any reason, and refinish the slope or embankment to the indicated lines and grades.

F. Safeguarding of Walls: Heavy equipment and rollers shall not be operated within four feet (4′) of walls.

G. Dust and Dirt Control: Provide satisfactory control or remove dust and/or dirt at the project site and adjacent roadways whenever traffic or buildings that are occupied or in use, are affected.

H. Cultural Resource Protection: After clearing in accordance with Section 311000 – Site Clearing, place geotextile for separation directly on the existing ground surface. Place half the depth of fill on the geotextile. Lay high visibility fence on top of half the depth of fill before adding final fill.

3.5 ROUGH GRADING AND FILLING

A. Prior to commencement of structural earthwork, perform such soil removal and filling as may be required to facilitate the progress of the Work and bring all elevations to the rough grading lines indicated on Contract Drawings. Grading shall be by blading or as herein specified under Section 3.17.

B. Fill or backfill test pits, or holes which will not be completely removed by excavation, with Class CDF concrete or crushed stone, and compact in layers not to exceed six inches (6″) after compaction and satisfying all requirements of the State of Washington Department of Ecology.

C. Fill or backfill holes, swales, and low points that will not otherwise be removed in the course of the Work, to the indicated grades.

3.6 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

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 excavated trenches as temporary drainage ditches.
2. Install a dewatering system, specified in Division 31 Section "Dewatering," to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

C. The ground surface around the structures should be sloped to create a minimum gradient of 2% away from the building foundations for a distance of at least 5 feet. Surface water should be directed away from all buildings into drainage swales or into a storm drainage system. "Trapped" planting areas should not be created next to any building without providing means for drainage. The roof downspouts should discharge onto splash blocks or pavement surfaces which direct water away from the buildings, or into smooth-walled underground drain lines that carry the water to appropriate discharge locations at least 10 feet away from any buildings.

3.7 EXPLOSIVES

A. Explosives: Do not use explosives.

3.8 EXCAVATION, GENERAL

A. Perform excavating as indicated and required for roadway beds, for concrete footings, foundations, and for site levels and grading, and provide shoring, bracing, underpinning, cribbing, pumping, and planking as required.

B. The bottoms of excavations shall be level, firm, undisturbed earth, clean and free from loose material, debris, and foreign matter.

C. Excavate to the lines and grades indicated on the Contract Drawings.

D. Limits of excavations shall allow for adequate working space for installing forms, wall waterproofing, and as required for safety of personnel.

E. Except as otherwise indicated, preserve the material below and beyond the lines of excavations. Where excavation is carried below the indicated grade, backfill to the indicated grade as herein specified using materials specified in Section 2.2.

F. Excavation and its restoration, for convenience of the Contractor, shall be at no additional expense to the Owner.

G. Configuration and maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Temporary excavation shall be shored or sloped in accordance with Safety Standards for Construction Work, Part N, WAC 296-155-650 through 66411. The soils should be sloped at 1-½ H:1V (Horizontal to Vertical) when workers are below.

H. The excavation shall not encroach on a 2H:1V line extended downward from existing footings and slabs. New loads shall be kept beyond a 2H:1V line extending upward from the excavation toe.

I. Place excavated material at sufficient distance from edge of excavation so as not to cause cave-ins or bank slides, but in no case closer than three feet (3′) from the edge of excavations.

J. Condition excavated earth material that is suitable for backfill or embankment for re-use. Test, screen, and mix as necessary to meet specified requirements.

K. Footing excavations shall be free of any loose, soft, or disturbed material; and water prior to placement of reinforcing bars and concrete.

L. Excavation near building footing shall be shored to prevent movement of in situ materials supporting building foundations.

3.9 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing bearing pad. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended for bearing surface.

B. Subgrade preparation: Exposed subgrades shall be prepared by removing loosened soils where practical and recompacting the subgrade surface to a firm, unyielding state, Localized zones of loose granular soils observed within a subgrade shall be compacted to a density commensurate with the surrounding soils. Organic, soft, or pumping soils observed within a subgrade shall be overexcavated and replaced with a suitable structural fill material. Geotextile separator shall be laid on the subgrade prior to structural fill placement.

3.10 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

B. Subgrade preparation: Exposed subgrades shall be prepared by removing loosened soils where practical and recompacting the subgrade surface to a firm, unyielding state, Localized zones of loose granular soils observed within a subgrade shall be compacted to a density commensurate with the surrounding soils. Organic, soft, or pumping soils observed within a subgrade shall be overexcavated and replaced with a suitable structural fill material.

3.11 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.

1. Clearance: Trench width shall be in accordance with WSDOT/APWA Section 2-09.4.

C. Trench Bottoms: Excavate trench for 6-inches of bedding below the pipe.

D. Yielding subgrade shall be overexcavated, to a maximum depth of 36 inches and be replaced with a suitable fill material compacted to a uniform density of at least 90 percent (based on ASTM D-1557). Geotextile separation fabric shall be placed between the fill and native soils.

3.12 EXCAVATION FOR PLANTING ISLANDS

A. Excavate planting island to 26 inch depth measured from finish grade to provide a total planting depth of 32 inches (from top of curb).

3.13 EMBANKMENT CONSTRUCTION

A. Construct embankments to lines, grades, and contours indicated, in layers as nearly uniform and horizontal as is consistent with the indicated finished contour and profile. Maximum thickness of the layers shall conform to the following requirements:

1. Embankment: Eight inches (8") before compaction and six inches (6") after specified compaction.

B. Compact each layer to specified density for entire width of the fill or embankment. Achieve required compaction by rolling with compaction equipment suitable for type and condition of the particular material. Roll in a longitudinal direction parallel to longest dimension, starting at outer edged and progressing toward the center.

C. Moisture-condition embankment fill material as required to achieve its compaction to the specified density, within the tolerances specified herein.

D. Do not compact material that contains excessive moisture. In such cases, scarify to the full depth of the layer having excessive moisture content and dry by reworking, mixing with dry materials, or other approved methods.

E. Finished fill slopes shall be constructed at an inclination no steeper than 2:1. Fill slopes shall be overbuilt and trimmed back as necessary to expose a well-compacted surface.

F. Structural fill supporting footings shall extend laterally outside of the footing base at a 1H:1V or flatter inclination projected down and away from the bottom edges of the footing.

G. Routine maintenance of slope sloughing and erosion should be anticipated. Fill slopes and areas disturbed during construction shall be planted with vegetation to reduce erosion.

H. Remove material that cannot be compacted to the required density within specified tolerances, and replace with suitable material at no additional expense to the Owner.

I. Do not commence final shaping until above specified requirements have been completed. Shape entire surface of trackway and the slopes of cuts and embankments to true grade, alignment, and cross section indicated. Open ditches, drains, and culverts resulting from construction operations to drain effectively.

3.14 SUBGRADE PREPARATION AND APPROVAL

A. Notify Contracting Officer when excavations have reached required subgrade.

B. If Contracting Officer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Perform all cutting, blading, and shaping as required to cut and shape the subgrade to the grades and elevations indicated.

D. Subgrade preparation includes fine grading, reworking as necessary, and preparation of cut, fill, or embankment upon which structure and equipment foundations, pipe, base, and pavement will be placed.

E. After the material has been thoroughly mixed and moisture-conditioned, accurately construct and fine grade the subgrade to indicated line, grade, and contour with high and low spots eliminated. Compact for full width to the specified density. Remove soft spots developed during working, fill with approved material, and re-compact.

F. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5km/h).
2. Proof-roll with loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Contracting Officer and replace with compacted backfill or fill as directed.

G. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

H. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Project Representative, without additional compensation.

3.15 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Owner.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Owner.

3.16 UNSUITABLE FOUNDATION EXCAVATION

A. When directed by the Owner, the Contractor shall remove and replace the unsuitable material before building any improvements over it. Excavation limits of such material will be set by the Owner.

3.17 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.18 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.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Place backfill in horizontal layers not to exceed eight inches (8″) of loose material, and compact each layer to specified density before the next layer is placed.

D. Place backfill material in such a manner that unbalanced horizontal loads will not be applied to a newly placed structure or portion of a structure, utilities, or pipelines. Do no backfill around portions of structures requiring backfill on only one side or on less than all sides, until the concrete has reached the specified strength to withstand the earth pressures.

E. When imported granular material is placed over wet or soft soil subgrades, place geotextile for soil separation or stabilization as a barrier between the subgrade the imported granular material.

F. Do not backfill on or against structural concrete until the specified 28-day concrete strength has been attained.

G. Do not use compaction equipment and methods that produce excessive horizontal or vertical earth pressures.

3.19 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Place backfill material around utility structures; shield to protect structures and waterproofing or coating thereof, and prevent displacement and damage by soil placement. Do not proceed with backfilling on or against concrete utility structures until those structures have reached 67% of their 28-day compressive strength, except thrust blocks against which backfill may be places not less than 24 hours after placement of concrete.

C. Obtain utility owner's approval before backfilling on or around utility lines and facilities. Coordinate with the Contracting Officer to obtain these approvals.

D. Within building areas and the upper 2 feet below subgrade in pavement areas, utility trench backfill should be compacted to at least 95 percent relative compaction. Below 2 feet in pavement areas, the landfill should be compacted to at least 90 percent compaction.

E. Within 8 inches of the crown of utility pipes, compaction should be completed only with small, low energy compaction tools such as a jumping jack or small plate compactor. Heavy compaction equipment should not be permitted to operate above utilities prior to low-energy compaction of the initial 8-inch lift, and placement of an additional 8 inches of fill, loose measure.

F. Provide 4-inch- (100-mm-) thick, concrete-base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway subbase.

G. Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the utility pipe or conduit.

    1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

H. Controlled Density Fill: Place initial backfill of controlled low-strength material to a height of 12 inches (300 mm) over the utility pipe or conduit.

I. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

J. Place and compact final backfill of satisfactory soil to final subgrade elevation.

K. Controlled Density Fill: Place final backfill of controlled low-strength material to final subgrade elevation.

L. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.20 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 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.

3.21 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) 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. Fill compaction shall be verified by means of in-place density tests performed per ASTM D6938 (or appropriate alternative when ASTM D6938 is not suitable for the fill material) during fill placement so that compaction may be evaluated as earthwork progresses.

D. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 95 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent. The upper 2-feet of the trench backfill should be compacted to at least 95 percent.

3.22 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. Unpaved Areas: Plus or minus 1 inch (25 mm).
2. Planting Areas: Plus or minus 3 inches.
3. Walks: Plus or minus 1 inch (25 mm).
4. Pavements: Plus or minus 1/2 inch (13 mm).

3.23 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase and base course under pavements and walks as follows:

1. Place base course material over subbase course under hot-mix asphalt pavement.

2. Shape subbase and base course to required crown elevations and cross-slope grades.
3. Place subbase and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
4. Place subbase and base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
5. Compact subbase and base course 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.

C. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.24 WET WEATHER EARTHWORK

A. On-site soils are moisture sensitive and these soils will become unstable and unsuitable when allowed to become wet.

B. Slope the ground surface within and surrounding the construction area to promote runoff away from work areas and to prevent ponding of water.

C. Maintain the minimum TESC measures as shown on plans and as described in Section 31 25 00. Supplement as necessary to maintain site.

D. Work areas should be covered with plastic to protect from rainfall. Measures such as sloping, ditching, dewatering, and installation sumps shall be employed.

E. Earthwork should be accomplished in small sections to minimize exposure to wet conditions. Each section should be small enough so that the removal of unsuitable soil and placement and compaction of clean structural fill can be accomplished on the same day.

F. Do not leave soil uncompacted and exposed to moisture. A smooth-drum vibratory roller, or equivalent, should roll the surface to seal out as much water as possible.

G. Limit the areas that are stripped of topsoil and exposed during wet weather.

H. Grading and earthwork shall not be performed during periods of heavy, continuous rainfall.

3.25 FIELD QUALITY CONTROL

A. Testing agency shall 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 the following locations and frequencies:

1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than 3 tests.
2. Fill or Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.

B. When testing agency reports that subgrades, fills, 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.

C. Density Tests: Compacted fill, backfill, and embankment shall be tested to verify compliance with specified requirements in accordance with WSDOT Test Method No. 606.

D. Any completed earthwork disturbed by subsequent construction operations or adverse weather shall be corrected in a verified manner as directed by the Project Representative.

3.26 PROTECTION

A. The subgrade must be protected from other construction activities, traffic, and weather conditions. The subgrade will degrade and become unsuitable if the soil gets too wet or too dry. Construction activity and equipment of all types have the potential to disturb and negatively impact the prepared subgrade. The contractor shall implement suitable procedures to protect the subgrade, such as excavating without tracking on the native soils, use of a crushed rock or gravel-working mat, dewatering, soil admixing, geotextiles, or other suitable procedures during construction.

B. Pavement and foundation subgrade shall be maintained in a well-compacted state and protected from degradation prior to paving or placing concrete. Protection measures may include restricted traffic, perimeter drain ditches, or placement of a protective gravel layer on the subgrade. Disturbed or wet areas in the subgrade shall be removed and replaced with suitably compacted structural fill.

C. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

D. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

E. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.27 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner’s property.

END OF SECTION

SECTION 312500 – EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Work consists of temporary control measures to control water pollution and soil erosion through the use of interceptor ditches, wattles, silt fence, inlet protection, rock check dams, sandbags, rip rap, stabilized construction entrance, construction fencing, temporary chain link fences, Baker tank, and other erosion control devices or methods. The Work described herein and shown on the Plans constitute the Erosion and Sediment Control Plan (ESC Plan). Temporary pollution control provisions contained herein shall be coordinated with any and all permanent erosion control features specified elsewhere in the contract to the extent practicable to assure economical, effective, and continuous erosion control throughout the construction and post-construction period.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 311000 – Site Clearing
2. Section 312000 – Site Earthwork

1.3 RELATED DOCUMENTS

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

B. All site clearing work shall be in accordance with the Washington State Department of Transportation and American Public Works Association WSDOT/APWA Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, Current Edition, Sections 8-01 and 9-14, and other sections as specified or applicable.

C. WSDOT/APWA Standard Plans for Road, Bridge and Municipal Construction, Current Edition.

1.4 SUBMITTALS

A. At the pre-construction conference or prior to the start of the construction, the schedule for accomplishment of temporary and permanent erosion control work shall be submitted. No Work shall begin until the erosion control schedule and methods of operation have been reviewed and found to comply with the requirements of the plans and specifications. The approved ESC Plan and schedule shall be subject to approved modifications during construction.

1.5 QUALITY ASSURANCE

A. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal or State or local agencies, the more restrictive laws, rules, or regulations shall apply.

1.6 PROJECT CONDITIONS

A. General:

1. Contractor shall limit the surface area of erodible earth material exposed by clearing, grubbing, excavation, borrow, embankment, and fill operations based on the ability to control erosion and sediment transport as specified herein. Provide immediate, permanent, or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment. Construct temporary berms, dams, and use of temporary mulches, mats, seeding, or other control devices or methods as necessary to control erosion.
2. The ECP facilities shall be constructed as shown on the plans and as specified herein in conjunction with all clearing, grading, and other land alteration activities, and in such a manner as to ensure that sediment laden water does not enter the drainage systems, or violate applicable water standards.
3. The ECP facilities shown on the plans are the minimum requirements for the anticipated site conditions. Additional temporary BMP's may be required due to actual phasing of the work. The ECP facilities shall be upgraded as needed during the construction period for unexpected storm events or for other reasons to ensure that sediment laden water does not leave the construction site.

B. Permanent Features:

1. All permanent erosion control features shall be incorporated into the project at the earliest practicable time as outlined in the Contractor's accepted schedule. Temporary pollution control measures shall 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 pollution control features, or to temporarily control erosion that develops during normal construction.
2. Where erosion is likely to be a problem during clearing and grubbing operations, work shall 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 shall be required between successive construction stages.

C. Areas of Work:

1. Limit the area of clearing, grubbing, excavation, borrow, and embankment operations in progress commensurate with the Contractor's capability and progress in accordance with the Contractor's submitted schedule and based upon construction conditions. Should seasonal limitations make such coordination of operations unrealistic, temporary erosion control measures shall be taken immediately.

2. The boundaries of the clearing limits will be clearly flagged by the Architect upon request prior to construction. Disturbance of the ground will not be permitted beyond the flagged boundary. The flagging shall be maintained for the duration of construction.
3. Temporary erosion and sedimentation control may include construction work outside the clearing limits where such work is necessary as a result of project construction such as stockpile operations, and equipment storage sites.

D. Maintenance and Removal:

1. The erosion control features installed shall be acceptably maintained, including replacement and upgrading of the facilities when needed, until the project is completed and notice of final acceptance issued.
2. The ECP facilities on active construction sites shall be inspected daily and repaired as necessary to ensure their continued functioning. Inactive sites shall be inspected at least monthly and inactive and active sites shall be inspected at least daily during rainy periods. Deficiencies shall be corrected immediately.
3. Catch basin inserts shall be maintained in accordance with the City of Bothell standard plans. All catch basins and storm drains shall be cleaned prior to paving and prior to project acceptance. The sediment shall be removed and sediment laden water shall not be flushed into the downstream system.
4. All paved areas shall be kept clean for the duration of the project. Roads shall be cleaned thoroughly at the end of the work day, or more often if necessary. Soil deposits shall be removed from roads by shoveling or sweeping. Street washing, which must be approved by the Architect, shall be allowed only after sediment is removed in this manner. Additional measures to those shown on the plans may be required.
5. At no time shall more than a one-foot depth of sediment be allowed to accumulate behind a silt fence. Sediment shall be removed or regraded into slopes, and the silt fences repaired and reestablished as needed.
6. Silt fences shall be removed in their entirety when no longer required. They will be required until the uphill area has been permanently stabilized.
7. All pipes and sections, drainage curbs, silt fences, and other materials which are removed from temporary erosion control devices and not incorporated into the permanent work shall become the property of the Contractor and shall be removed from the area. Materials shall be disposed of in accordance with local and State laws and in a suitable location.

PART 2 - PRODUCTS

2.1 EROSION CONTROL DEVICES

A. Materials shall be as specified in WSDOT/APWA Section 9-14.6.

2.2 CONSTRUCTION GEOTEXTILE

A. Materials shall be as specified in WSDOT/APWA Section 9-33.

2.3 RIPRAPS AND QUARRY SPALLS

A. Materials shall be as specified in WSDOT/APWA Section 9-13.1.

2.4 BAKER TANK FILTRATION SYSTEM

A. If Contractor elects to use a Baker Tank Filtration System, the system shall be sized in accordance with the Department of Ecology Stormwater Management Manual (Western Washington) to accommodate flow generated from the site runoff and any dewatering of groundwater.

B. Contractor shall submit system sizing calculations and system layout to the Owner for approval prior to operation.

2.5 WATTLES

A. Wattles shall consist of seed free, straw fibers encased in tubular netting shall be a minimum of 8 inches in diameter.

B. Wattles shall be installed in accordance with the manufacturer's recommendations.

C. Non-plastic all-natural jute, coir or cotton type netting. Netting material shall be from cuts, tears, or weak places.

D. Stakes for wattles shall be made of wood from untreated Douglas fir, hemlock, or pine species.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor shall limit the surface area of erodible earth material exposed by clearing, grubbing, excavation, borrow, embankment, and fill operations based on the ability to control erosion and sediment transport as specified herein. Contractor shall provide immediate, permanent, or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment.

B. The ESC facilities shall be constructed as shown on the plans and as specified herein in conjunction with all clearing, grading, and other land alteration activities, and in such a manner as to ensure that sediment-laden water does not enter the drainage systems, or violate applicable water standards.

C. The ESC facilities shown on the Plans are the minimum requirements for the anticipated site conditions. Additional temporary best management practices (BMPs) may be required due to actual phasing of the work. The ESC facilities shall be upgraded as needed during the construction period for unexpected storm events or for other reasons to ensure that sediment laden water does not leave the construction site.

D. The ESC facilities shall be inspected and maintained by Contractor as specified in WSDOT/APWA Sections 8-01.3(1)B and 8-01.3(15).

E. All pipes and sections, drainage curbs, silt fences, and other materials which are removed from temporary erosion control devices and not incorporated into the permanent work shall become the property of Contractor and shall be removed from the area. Materials shall be disposed of in accordance with local and State laws and in a suitable location.

3.2 AREAS OF WORK

A. The boundaries of the clearing limits will be clearly flagged by Contractor and reviewed by the Contracting Officer prior to construction. Disturbance of the ground will not be permitted beyond the flagged boundary. The flagging shall be maintained for the duration of construction.

B. Temporary erosion and sedimentation control may include construction work outside the clearing limits where such work is necessary as a result of project construction such as stockpile operations and equipment storage sites.

C. All paved areas shall be kept clean for the duration of the project. Roads shall be cleaned thoroughly at the end of the work day, or more often if necessary. Soil deposits shall be removed from roads by shoveling or sweeping. Street washing, which must be approved by the Contracting Officer, shall be allowed only after sediment is removed in this manner. Additional measures to those shown on the plans may be required.

3.3 PLASTIC SHEET

A. Plastic sheet covering shall provide immediate erosion protection to slopes and disturbed areas when vegetative cover cannot be achieved due to soils, slopes, or time of year.

B. Plastic sheet covering shall be used:

1. On disturbed areas which require immediate erosion protection.
2. On areas of steep slopes (greater than 50 percent) and areas of moderate slopes that are prone to erosion, particularly during wet weather season (October 1 through April 30).
3. As a temporary measure to provide erosion protection on areas seeded between October 1 and March 31.

C. Covering shall be installed and maintained tightly in place by using sandbags or tires on ropes, or staked, with a maximum 10-foot grid spacing in all directions. All seams shall be taped or weighted down full length and there shall be at least a 12-inch overlap of all seams. For seams parallel to the slope contour, the uphill sheet shall overlap the downhill sheet.

D. Drainage from areas covered by plastic sheeting shall be controlled such that no discharge occurs directly onto uncontrolled, disturbed areas of the construction site.

E. Clear plastic sheeting shall be installed immediately on areas seeded between October 1 and March 31, and remain until vegetation is firmly established.

F. When the plastic sheeting is used on unseeded slopes, it shall be left in place until the next seeding period.

3.4 STORM DRAIN INLET PROTECTION

A. Storm drain inlet protection shall prevent sediment from entering storm drain systems prior to permanent stabilization of disturbed areas.

B. Storm drain inlet protection shall be used:

1. Where storm drain inlets are operational before permanent stabilization of the disturbed drainage area.
2. Adjacent to and immediately downhill of utility type construction in existing paved areas with catch basin drainage.
3. When cleaning streets.

C. Berms may be required to direct drainage to flow through the filters and prevent bypassing of the inlets.

D. Sediment shall be removed and inlet protection restored as needed to maintain their sediment trapping and filtering capability.

E. When the depth of accumulated sediment and debris reaches approximately ½ the height of the inlet protection device, or less when specified by the manufacturer, the deposits shall be removed and stabilized on-site.

3.5 WATTLES

A. Wattles shall be installed as soon as construction will allow or when designated by the Contracting Officer. Wattle installation and trenching shall begin from the base of the slope prior to any topsoil or compost placement. Excavated material from trenching shall be spread evenly along the uphill slope and be compacted using hand tamping or other method approved by the Contracting Officer. On gradually sloped or clay-type soils trenches shall be 2 to 3 inches deep. On loose soils, in high rainfall areas, or on steep slopes, trenches shall be 3 to 5 inches deep, or half the thickness of the wattle, whichever is greater.

B. Wattles shall be laid out, spaced, and staked. If trenching and staking is not possible due to rocky soils, compost socks shall be used instead of wattles.

C. The Contractor shall exercise care when installing wattles to ensure the method of installation minimizes the disturbance of waterways and prevents sediment or pollution discharge into water bodies.

3.6 HIGH VISIBILITY FENCE

A. High visibility fence shall be installed at locations show in the Plans. The fence material shall be securely attached to the posts and support system.

B. Posts shall not be spaced further than six feet apart and shall be embedded in the soil a minimum of one foot.

3.7 SILT FENCES

A. Silt fence shall reduce the transport of sediment from a construction site by providing a temporary physical barrier to sediment and reducing runoff velocities. The terms “filter fabric” and “geotextile” are used interchangeably herein.

B. Silt fences shall be constructed:

1. Down the slope below disturbed areas where runoff may occur as sheet runoff.
2. At grade breaks exceeding 20 percent.
3. At the toe of soil stockpiles.

C. Silt fences shall be constructed along the contours where feasible.

D. If trenching is not feasible due to rocky soils or not advisable due to proximity to a downslope sensitive area, a different sediment control device that does not require trenching shall be used in place of silt fence.

E. At no time shall more than a one-foot depth of sediment be allowed to accumulate behind a silt fence. Sediment shall be removed or regraded into slopes, and the silt fences repaired and reestablished as needed.

F. Silt fences shall be removed in their entirety when no longer required. They will be required until the uphill area has been permanently stabilized.

3.8 STABILIZED CONSTRUCTION ENTRANCE

A. Stabilized construction entrance shall be installed per WSDOT Standard Plan No. I-80.10.

3.9 EROSION CONTROL BLANKET

A. Erosion control blankets shall be installed according to the manufacturer’s recommendations.

B. Seeding and fertilizing shall be done prior to blanket installation. Coordinate with the Contracting Officer to scheduled seeding by the National Park Service prior to blanket installation.

C. Select erosion control blanket material for an area based on the intended function: slope stabilization and site-specific factors including soil, slope gradient, rainfall, and flow exposure. Erosion control blankets shall not be used on slopes or in ditches that exceed the manufacturer’s recommendations.

END OF SECTION

SECTION 321216 – ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes hot mix asphalt (HMA) for roadways and parking areas, and miscellaneous paving.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 015526 – Traffic Control
2. Section 312000 – Site Earthwork

1.3 REFERENCE DOCUMENTS

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

B. All work in this section shall be in accordance with the Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, Current Edition.

1.4 SUBMITTALS

A. Product Data for the following:

1. Asphalt, aggregate, asphalt binder, asphalt mix design.

B. Asphalt mix design submittal shall be submitted in writing by the Contractor at least 30 days prior to the start of paving operations and shall include as a minimum:

1. Percent passing each sieve size.
2. Percent of asphalt binder.
3. Performance graded asphalt binder certified test results and Material Certificate certifying the PG grade, including source and location.
4. Mixing temperature.
5. Compaction temperature.
6. Percent anti-stripping additive.

C. Delivery tickets.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Paving asphalt shall be AR-4000W.

B. HMA shall be Class ½" PG 64-22 unless noted otherwise in the plans. HMA shall conform to the requirements of Sections 5-04 and 9-02 of WSDOT Standard Specifications.

PART 3 - EXECUTION

3.1 GENERAL

A. All construction requirements shall conform to Section 5-04.3 of the WSDOT/APWA Standard Specifications.

B. Conduct paving operations in a manner to minimize interference with roads, streets, walks, and other adjacent occupied and used facilities. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways.

C. Where HMA is placed in areas not retained by curb faces, walls, and other vertical surfaces, the closed edges of the asphalt concrete shall be compacted to meet the same density requirements as the other asphalt surfaces.

D. Where a new asphalt surface joins an existing asphalt surface, tack coat shall be applied to the existing surface at the rate of 0.1 gallons per square yard. Fine building sand shall be swept into the joint to function as filler. Joints shall be trimmed to form near vertical surfaces and neat lines prior to asphalt placement.

E. HMA for roadways shall be placed in two lifts.

3.2 PROTECTION OF SUBGRADE

A. Contractor shall be responsible for protection of the subgrade.

3.3 FIELD QUALITY CONTROL

A. Take samples and perform tests in accordance with WSDOT/APWA Standard Specifications Sections 5-04.3(9) and 5-04.3(10).

END OF SECTION

SECTION 321313 – EXPOSED OYSTER SHELL CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

1. Walkways.
2. Plazas.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 010000 – General Requirements
2. Section 033353 – Miscellaneous Site Concrete

1.3 RELATED DOCUMENTS

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

B. All work in this section shall be in accordance with the Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, Current Edition.

1.4 REFERENCES

A. See Section 033353 for references.

1.5 SUBMITTALS

A. See Section 033353 for submittal requirements.

B. Samples: 10-lb. sample of exposed crushed oyster shells. Information from oyster shell supplier indicating source, type, color, and gradation of oyster shell shall accompany sample.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Experienced installer who has completed pavement work similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications:

1. Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
2. Manufacturer certified in according to the National Ready Mix Concrete Association's Plant Certification Program.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated as documented according to ADTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

F. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.

1. Build a 4' x 4' mockup on site. If location not indicated, as directed by Owner's representative.
2. Notify Owner's representative seven days in advance of dates and times when mockups will be constructed.
3. Obtain approval from Owner's representative before starting mockup construction.
4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
5. Demolish and remove approved mockups from the site when directed by Owner's representative.

G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section, "General Requirements".

1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixes.
c. Ready-mix concrete producer.
d. Concrete subcontractor.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth, exposed surfaces.

1. Use flexible or curved forms for curves of a radius 100 feet or less.

B. 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.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

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

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

1. 1/2 inch steel bars 15 inch center.

2.3 CONCRETE MATERIALS

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

1. Concrete for exposed crushed oyster shell paving shall be Portland Cement ASTM C150, Type I, Gray as required to match color of concrete used on standard [Insert Option Here] sidewalks.

B. Exposed Crushed Oyster Shells: Exposed hard, sound, durable, and free of all deleterious materials and staining qualities. Provide oyster shells from a single source.

1. Store crushed oyster shells off the ground and protected from moisture.
2. Oyster shells shall match color, size, and gradation of the oyster shells used in the exposed aggregate sidewalks and pavement existing in the immediate vicinity of the Project.
3. Water: Potable.

2.4 CURING MATERIALS

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

B. Water: Potable.

2.5 RELATED MATERIALS

A. Board Filler: #1 treated #1 Southern Yellow Pine.

1. Board filler shall be free of defects which will impair their usefulness as expansion joint fillers.

B. Joint Sealing Material: Pavement joint sealing material shall meet the requirements and specifications of TxDOT item 360.2 (8).

C. Acid: Acid for acid wash shall be 5-10 percent solution of muriatic acid. Acid solution shall be tested on aggregate to ensure that aggregate does not dissolve or discolor.

D. Sealer: Methyl methacrylate acrylic resin suitable for sealing of exposed aggregate horizontal concrete surfaces. Sealer shall be subject to approval.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:

1. Exposed Crushed Oyster Shell Surface: Concrete to receive an exposed crushed oyster shell surface shall contain a minimum of 560 lb. of ASTM C 150 Type II Portland cement per cubic yard of concrete.
2. Compressive Strength (28 Days): 3000 psi.
3. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.53.
4. Slump Limit: 4 inches, plus or minus 1 inch.
5. Air Content: 6 percent plus or minus 1 percent.
6. Aggregate size shall be a minimum of 3/8 inch and a maximum of 3/4 inch.

Commented [BS1]: Confirm oystershell size

B. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

C. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll prepared sub-base surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

B. Remove loose material from compacted sub-base surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

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

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. When joining existing pavement, place transverse joints to align with previously placed joints unless otherwise indicated.

C. Install dowel bars and support assemblies at joints where indicated.

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

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool. Repeat grooving of contraction joints after applying surface finishes to a 1/4-inch (6 mm) radius. Eliminate grooving marks on concrete surfaces.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete form-work installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from sub-base surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten sub-base to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at Project site, or during placement.

F. Deposit and spread concrete in a continuous between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away form joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

3.6 FINISHES

A. Seeded Crushed Oyster Shell Finish: Immediately after floating, broadcast a single layer of oyster shells uniformly onto the pavement surface. Tamp seeded crushed oyster shells into plastic concrete, and float to entirely embed crushed oyster shells with mortar cover of 1/16 inch.

1. Prior to the concrete placing operation, all crushed oyster shells shall be thoroughly washed so that they are free of all dust, dirt, and clay particles. The crushed oyster shells shall be in a damp condition but without free surface water at the time of seeding application. There shall be sufficient crushed oyster shells on hand to complete the seeding once it has commenced.
2. The seeding operation shall start immediately after the placement of concrete as described above. The crushed oyster shells shall be carefully and uniformly seeded by suitable means so that the entire surface is completely covered with one layer of crushed

oyster shells. The crushed oyster shells shall be embedded by suitable means. Care shall be taken to not over-embed and deform the surface. Under no circumstances shall areas lacking sufficient mortar be filled with small quantities of the base concrete mix.

3. Without dislodging crushed oyster shells, remove excess mortar by lightly brushing surface with a stiff, nylon bristle broom.
4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from pavement surfaces to depth required.
5. Work shall be planned so that the concrete placing and crushed oyster shells seeding procedures are coordinated with the capabilities of the washing and brushing crew.

3.7 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection and ACI 305 R for hot-weather protection during curing.

C. Evaporation Retarder: Apply evaporation retarder to 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.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these methods.

3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.

B. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.

1. Lateral Alignment and spacing of Tie Bars and Dowels: 1 inch.
2. Vertical Alignment of Tie Bars and Dowels: 1/4 inch (6 mm).
3. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
4. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: length of dowel 1/4 inch per 12 inches.
5. Joint Spacing: 3 inches.
6. Contraction Joint Depth: Plus 1/4 inch, no minus.
7. Joint Width: Plus 1/8 inch, no minus.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: The contractor shall engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement.

1. Compressive-strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cubic yards, but less than 25 cubic yards plus one set for each additional 50 cubic yards.
2. One specimen shall be tested at 7 days and two specimens at 28 days. One specimen shall be retained in reserve for later testing if required.

B. Test results shall be reported in writing to Owner's representative, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain:

1. Project identification name and number.
2. Date of concrete batch in pavement.
3. Design compressive strength at 28 days.
4. Concrete mix proportions and materials.
5. Compressive breaking strength.
6. Type of break for both 7 and 28 day tests.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores where directed by Owner's representative when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 321700 – PAVING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Furnishing, installing, and removing pavement markings upon the roadway and parking area surface in accordance with the plans.
2. Furnishing and installing traffic and wayfinding signage.
3. Installing precast cement concrete wheelstops.

1.2 RELATED DOCUMENTS

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

B. All work in this section shall be in accordance with the Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, Current Edition.

1.3 SUBMITTALS

A. Product Data: Thermoplastic and paint, wheelstops, signs, and sign posts.

B. Manufacturer’s Certification: Products meet or exceed specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pavement Markings shall conform to Section 9-34 of the WSDOT/APWA Standard Specifications. Pavement markings paint shall be on the WSDOT Qualified Products List (QPL). Blue paint for accessible parking space symbol shall be chosen from a WSDOT QPL-listed manufacturer for white and yellow paint.

B. Traffic signs shall conform to WSDOT/APWA Section 9-28 and the WSDOT Sign Fabrication Manual. Signs shall be aluminum.

C. Wheel stops shall be 6 feet in length, precast, constructed of 5000 psi air-entrained concrete, reinforced with two (2) No. 3 reinforcing bar, and constructed with tapered sides, slots on the underside, and two (2) ¾”-inch diameter thru-holes for anchoring.

PART 3 - EXECUTION

3.1 PREPARATION

A. The Contractor shall clean the pavement of dust, dirt, old pavement markings, concrete curing compounds, and other foreign material which may be detrimental to the adhesion of the pavement marking materials.

3.2 PAVEMENT MARKINGS

A. Layout – Do not apply traffic and lane markings until layout and placement have been verified by the Owner.

B. Removal of existing pavement markings, prior to installation of new pavement markings, shall be done in accordance with WSDOT/APWA Section 8-22.3(6). Painting over existing pavement markings is not allowed.

C. All parking stalls shall be single stripe, and shall be spaced equally. The line indicated on the Drawings is on the center line of the stall marking.

D. All parking stall markings shall be straight with sharp corners and clean edges. Crosswalks shall be painted white to the size, length, and spacing shown on the Drawings.

E. All markings shall be applied in one coat with brush, spray, or marking machine over clean dry pavement surfaces, when the atmospheric temperature is at or above 40°F, and when the weather is otherwise favorable in the opinion of the CO.

F. Use only skilled workmen who are experienced and normally employed in the work of installing pavement markings. Supply all the necessary equipment and materials required for the work.

G. The Contractor shall protect the buildings, walks, pavement, curbing, trees, shrubs, mulch, and other site fixtures from over-spray of paint and damage from pavement marking operations.

H. Traffic shall not be permitted on the pavement until the paint is thoroughly dry.

I. Construction requirements for pavement markings shall conform to the following sections of the WSDOT/APWA Standard Specifications:

1. Section 8-22.3(1) Preliminary Spotting
2. Section 8-22.3(2) Preparation of Roadway Surfaces
3. Section 8-22.3(3) Marking Application
4. Section 8-22.3(4) Tolerances for Lines
5. Section 8-22.3(5) Plastic Installation Instructions
6. Section 8-22.3(6) Removal of Pavement Markings

3.3 TRAFFIC SIGNAGE

A. Sign installation shall be in accordance with WSDOT/APWA Section 8-21.3.

B. Signs shall be erected so the sign face is vertical.

3.4 WHEEL STOPS

A. Wheel stops shall be installed per manufacturer's instructions, and shall be anchored to the pavement using No. 6 reinforcing steel embedded in the pavement a minimum of one foot.

END OF SECTION

SECTION 323300 – SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies requirements for:

1. Flag Pole
2. Bike Racks
3. Benches

1.2 SUBMITTALS

A. Submit the following in accordance with Section 013300, and with the additional requirements as specified for each:

1. Shop Drawings:

a. Provide details of construction and installation of fabricated items including materials, dimensions, methods of joining, fastenings, and anchoring.
b. Supply manufactures samples of finishes for approval by owner.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver products in good condition.

B. Store products to prevent corrosion, deterioration, and damage.

C. Handle products to prevent damage.

PART 2 - PRODUCTS

2.1 BIKE RACKS

A. “Cycloops Circulo;” Model: 2170-3-04-SM – Surface Mount, Finish: hot dipped galv; Manufactured by Columbia Cascade Company or approved equal. (http://columbia-cascade.com/) (Basis of Design)

B. Furnish all necessary installation items, including all bolts, nuts, templates, and other items required for complete anchored installation, as specified by manufacturer.

2.2 BENCHES

A. "Contour Bench with Armrests," Model 2155-6-P," pedestal mount; 70" length; recycled plastic slats; Manufactured by Columbia Cascade Company or approved equal. (http://columbia-cascade.com/) (Basis of Design)

1. Furnish all necessary installation items, including all bolts, nuts, templates, and other items required for complete anchored installation, as specified by manufacturer.

2.3 FLAGPOLES

A. Pole: Aluminum pole; 35 ft. height measured from finish grade.

B. Hardware: Stainless steel including (complete list of hardware approved by the Park forthcoming)

C. Rope: #10 -5/16" dia. white braided polypropylene halyard

D. Flags: provided by Washington State Parks

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate construction of the concrete footings for site furnishings with the installation of the surrounding pavement. Install site furnishings, level, square and plumb at location indicated on the plans.

B. Anchoring: All site furniture is to be surface mounted to concrete (as per manufacturer's specifications) or through concrete paving into a concrete base. Anchoring system is to be drilled and secured with expansion epoxy grout as supplied by approved manufacturer.

C. Assemble furnishings in accordance with manufacturer's instructions.

D. Protect site furnishings from paint spatter, concrete splashes, and other construction damage by wrapping in plastic sheeting or heavy kraft paper and taping in place. Do not remove until adjacent work is completed.

E. Protect site furnishing pedestals from chipping during troweling operations. Repair any damage to painted finish.

END OF SECTION

SECTION 329300 – PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Plants
2. Planting Soil
3. Wood Chip or Bark Mulch
4. Seed Mix

B. Related Sections:

1. Section 015639 – "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
2. Section 311000 – "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
3. Section 312000 – "Site Earthwork" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
4. Section 334600 – "Subdrainage" for below-grade drainage of landscaped areas, paved areas, and wall perimeters.

1.3 DEFINITIONS

A. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.

B. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

F. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

G. Planting Area: Areas to be planted.

H. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

I. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

J. Root Flare: Also called “trunk flare.” The area at the base of the plant’s stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

K. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

L. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

M. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Arborist Mulch: manufacturer source information.

B. Samples for Verification: For each of the following:

1. Compost: 1-gallon volume in sealed plastic bags labeled with source. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
2. Topsoil: 1-gallon volume in sealed plastic bags labeled with source. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

3. Arborist Mulch: 1-gallon volume in sealed plastic bags labeled with source. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

E. Material Test Reports: For imported or manufactured topsoil.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Experience: Three years' experience in successful landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Project Representative Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

D. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

E. Plant Material Observation: Project Representative may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety,

cultivar, size, and quality. Project Representative retains right to observe shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected shrubs immediately from Project site.

1. Notify Project Representative of sources of planting materials seven days in advance of delivery to site.

F. Preinstallation Conference: Conduct conference at Project site prior to installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways, and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. Do not prune shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.

4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Owner's written permission.

C. Planting Restrictions: Plant between September 30 and May 1. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
   b. Structural failures including plantings falling or blowing over.
   c. Faulty performance of tree stabilization and edgings.
   d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period:

   a. 12 months

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

1. Maintenance Period: 12 months from date of planting completion.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Project Representative, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

2.2 ORGANIC SOIL AMENDMENTS

A. Compost Blanket: Shall be applied as shown in Plans. Compost shall be Medium Compost and Fine Compost as shown in Plans. Comply with WSDOT Compost Blanket standard.

2.3 PLANTING SOILS

A. Topsoil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 10 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Topsoil by Volume: 1:10.

2.4 MULCHES

A. Arborist Wood Chip Mulch: Coarse ground wood chips (approximately ½″ to 6″ along the longest dimension) derived from the mechanical grinding or shredding of the above-ground portions of trees. It may contain wood, wood fiber, bark, branches, and leaves; but may not contain visible amounts of soil. It shall be free of weeds and weed seeds Including but not limited to plants on the Washington State Weed Control Board Noxious Weed List available at: https://www.nwcb.wa.gov/printable-noxious-weed-list, and shall be free of invasive plant portions capable of re-sprouting, including but not limited to horsetail, ivy, clematis, knotweed, etc. It may not contain more than 1/2% by weight of manufactured inert material (plastic, concrete, ceramics, metal, etc.).

2.5 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd.

2.6 SEED MIX

A. Areas designated on the plans as Native Buffer Meadow Seed Mix shall by hydroseeded with the following seed mix:

Hordeum brachyantherum	Meadow Barley	40%
Bromus carinatus	California Brome	26%
Lupinus albalculis Camassia quamash	Sicklekeel Lupine Small Camas	20% 4%

Festuca idahoensis romeri	Roemer's Fescue	3.9%
Carex obnupta	Slough Sedge	3.5%
Deschampsia cespitosa	Tufted Hairgrass	2%
Juncus tenuis	Poverty Rush	.10%
Agrostis exarate	Spike Bentgrass	.50%

B. The basis for seed mix design is Sunmark Coastal Grasslands Mix by Sunmark Seeds International, Fairview Oregon.

C. Seeding may be accomplished by approved hand methods when impractical to perform by hydroseeding. The Contractor shall submit the proposed plan for hand seeding to the Engineer for approval five days prior to any seeding. All seed mixes shall be applied at a rate of 1.5 pounds per 1,000 SF or 65.42 lbs/acre.

2.7 MISCELLANEOUS PRODUCTS

A. Burlap: Non-synthetic, biodegradable.

B. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

C. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, do not remove any soil unless directed by the owner.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual plant locations. Stake locations and adjust locations when requested, and obtain Project Representative's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Wrap shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 EXCAVATION FOR TREES AND SHRUBS

A. Excavation for trees and shrubs will occur only in fill areas. No excavation into existing grade will be authorized prior to approval from Owner's Representative.

B. Topsoil removed from excavations may be used as planting soil.

C. Obstructions: Notify Project Representative if unexpected rock or obstructions detrimental to shrubs are encountered in excavations.

D. Drainage: Notify Project Representative if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning shrubs.

3.4 SHRUB PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set plant stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use topsoil for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.5 SHRUB PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape shrubs according to standard professional horticultural and arboricultural practices. Do not cut tree leaders; remove only injured, dying, or dead branches from shrubs; and prune to retain natural character.

C. Do not apply pruning paint to wounds.

D. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Organic Mulch: Apply 3-inch average thickness of organic mulch over whole surface of planting area, and finish level with adjacent finish grades. Feather mulch within 3 inches of trunks or stems.

3.6 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use Plant Health Care practices including Integrated Pest Management whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.7 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.8 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner’s property.

END OF SECTION

SECTION 331000 – WATER UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Installation of potable water service from existing service line to welcome center building and shop.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 312000 – Site Earthwork

1.3 REFERENCE DOCUEMENTS

A. 2021 Uniform Plumbing Code published by the International Association of Plumbing and Mechanical Officials (IAPMO)

B. All work in this section shall comply with Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, current edition, Sections 7-09, 7-15, and other sections as specified or applicable.

1.4 SUBMITTALS

A. Product Data: For all materials including: pipe, fittings, valves, valve box, and accessories.

B. Manufacturer’s Certification: That products meet or exceed specified requirements.

C. When operations affect traffic, traffic control shall be provided for in accordance with Section 015526 “Traffic Control.”

D. Pipe testing reports.

E. “As-Built drawings” at project close-out according to Section 017700 “Closeout Procedures.”

1. Identify and accurately locate mains, valves, connections to existing improvements, thrust blocks, bends, fittings, and accessories.

1.5 QUALITY ASSURANCE

A. Test Results: All testing shall be performed in accordance with WSDOT/APWA Standards.

PART 2 - PRODUCTS

2.1 SUMMARY

A. All products shall conform to WSDOT/APWA Standards.

B. All materials shall be new and undamaged. The same manufacturer of each item shall be used throughout the work. All materials not specifically referenced shall comply with applicable sections of ANSI, ASTM, AWWA or the current WSDOT/APWA Standard Specifications and approved by the Engineer.

C. If required by the Engineer, the Contractor shall furnish certification from the manufacturer of the materials being supplied that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of the reference Standards.

2.2 DUCTILE IRON PIPE

A. Ductile iron pipe shall be Class 52 (Tyton joint only) and cement mortar lined unless otherwise specified and shall conform to AWWA/ANSI C151/A21.51. Standard thickness of cement mortar lining shall be in accordance with AWWA/ANSI C104/A21.4.

2.3 WATER SERVICE PIPE

A. Water service pipe shall be Driscopipe CTS Class 200 Hi-Mol Poly pipe. Driscopipe shall conform to ASTM D-27370SDR9 (PE3408). CTS 110 SS liners for polypipe shall be used.

2.4 FITTINGS AND JOINTS

A. All fittings for ductile iron pipe shall be ductile iron compact (short body) fittings conforming to AWWA/ANSI C153/A21.53 and shall be cement mortar lined conforming to AWWA/ANSI C104/A21.4.

B. Joints shall be mechanical joints or rubber gasket push-on joints (Tyton joints only) unless flanged joints or restrained joints are required and shown in the plans. Pipe with push-on joints or restrained joints are required and shown in the plans. Pipe with push-on joints shall be suitable for use with mechanical joint fittings. Ductile iron pipe fittings shall have a pressure rating of 350 psi for push-on or mechanical joint fittings and 250 psi for flange joint fittings drilled in accordance with AWWA/ANSI C111/A21.11, unless otherwise noted.

C. Rubber gaskets for push-on joints (Tyton joint only) or mechanical joints shall be in accordance with AWWA/ANSI C111/A21.11. Gasket material or flanges shall be neoprene, Buna N, chlorinated butyl, or cloth inserted rubber.

2.5 COUPLINGS

A. Flexible coupling and transition coupling cast components shall be ductile iron. Bolts and nuts shall be in accordance with ASTM A536-80, Grade 65-45-12. Bolts shall be high strength, low alloy steel track head bolts with national course rolled thread and heavy hex nuts. Gaskets shall meet AWWA/ANSI C111/A21.11 composition specifications.

2.6 BOLTS AND NUTS

A. Bolts, nuts, and washers used for securing fittings shall be on similar materials. Steel bolts shall meet the requirements of ASTM A 307 or ASTM F568 for carbon steel or ASTM F593 or ASTM F738 for stainless steel. Nuts shall meet the requirements of ASTM A563 for carbon steel or ASTM F594 or ASTM F836 for stainless steel. Iron bolts and nuts shall meet the requirements of ASTM A536, grade 65-45-12.

2.7 GATE VALVES

A. All gate valves shall be resilient seated gated valves conforming to the latest revision of AWWA C509 or C515. All gate valves shall be epoxy coated and turn counter clockwise to open. All gate valves shall have ANSI flanges or mechanical joints ends.

B. Buried gate valves shall be non-rising stem suitable for installation with the type and class of pipe being installed. Operating stems shall be equipped with standard 2 inch operation nut, and O-ring stem seals.

2.8 MARKER POSTS

A. Marker posts shall be Carsonite blue plastic markers and labeled “WATER” or approved equal.

2.9 VALVE BOXES

A. Valve boxes shall be installed on all buried valves. Ears (lugs) on all valve boxes shall be placed in alignment with the pipe. The box and lid shall be cast iron, two piece slip type. The cover shall have the word “WATER” cast in the upper surface. Valve boxes, lids and extensions shall be East Jordan Ironworks deep style lid. All casting shall be coated with asphaltic varnish.

B. A valve operating nut extension shall be furnished and installed on all valves where the finished grade is more than 36 inches above the valve operating nut. Extensions are to be a minimum or 12 inches long with only one extension per valve. The operating nut extension shall extend into the top section of the valve box.

2.10 TAPPING SLEEVES

A. Tapping sleeves shall be used in lieu of cut-in tees except as otherwise approved by the Engineer. Tapping sleeve valves shall be epoxy coated and resilient seat. Acceptable sleeves include:

Pipe Material	Type of Tapping Sleeve
Ductile Iron or Cast Iron Pipe	Epoxy Coated Fabricated Steel
Asbestos Cement	Fabricated Stainless Steel Full

2.11 SADDLES AND CORPORATION STOPS

A. Service saddles shall be ROMAC, Ford or equal and shall have stainless steel double straps.

B. Corporation stops shall be the ball valve type and shall be Ford or Mueller. Corporation stops for use with the saddle shall be of bronze in accordance with AWWA Standard C800 with AWWA IP inlet by compression outlet.

2.12 METER BOXES

A. Meter boxes used for meters, sampling stations, and blow-offs shall be high density polyethylene meter boxes with solid ductile iron hatches with 2 inch touch read hole manufactured by Mid States Plastics, Inc., or an equivalent as approved by the Engineer.

2.13 BACKFLOW PREVENTION DEVICES

A. Approved backflow prevention assemblies shall meet the requirements of the WAC 246-290-490 (“Cross Connection Control Regulation in Washington State”), and the recommendations of the PNWS-AWWA Cross Connection Control Manual.

2.14 CONCRETE

A. Thrust blocking, encasement, or slope anchor concrete shall be mixed from materials acceptable to the Engineer and shall have a 30-day compressive strength of not less than 3,000 psi.

B. The mix shall contain five (5) sacks of cement per cubic yard and shall be of such consistency that the slump is between 1 inch and 5 inches. All concrete shall be mechanically mixed.

2.15 BEDDING MATERIAL

A. Bedding material shall be as specified in Section 9-03.12(3) “Gravel backfill for Pipe Zone Bedding” of the WSDOT/APWA Standard Specifications.

PART 3 - EXECUTION

3.1 SUMMARY

A. Work shall be in accordance with WSDOT/APWA Standards.

B. The depth of trenching for water line piping shall provide a minimum of 3 feet of cover over the top of the pipe. Excavating and backfilling shall be as specified in Section 31 20 00 – Site Earthwork.

C. Water line pipes shall be cut using a tool or tools specifically designed to leave a smooth, even, and square end on the piping material to be cut. Pipe ends to be connected using couplings which seal to the outside surface of the pipe shall be cleaned to a sound, smooth finish before the couplings are installed.

D. Ends of mains and services, valves, blow-offs, and air releases shall be identified by highly visible marker posts at least 3 feet high and marked “Water” with blue paint. Contractor shall be responsible to maintain all markers during construction.

3.2 FIELD QUALITY CONTROL

A. Tests shall be performed in accordance with WSDOT/APWA Standards.

B. The Contractor shall perform the tests under the direction and in the presence of the Owner.

END OF SECTION

SECTION 333000 – SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes installation and/or modification of sanitary sewer service line, and installation of manholes and cleanouts.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 312000 – Site Earthwork

1.3 REFERENCE DOCUEMENTS

A. All work in this section shall comply with Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, current edition, Sections 7-01, 7-08, 7-18, and 7-19, and other sections as specified or applicable.

B. WSDOT/APWA Standard Plans for Road, Bridge and Municipal Construction, Current Edition.

C. Washington State Department of Health Standards.

1.4 SUBMITTALS

A. Product Data: For all pipe, fittings, structures, and accessories.

B. Manufacturer’s Certification: That products meet or exceed specified requirements.

C. When operations affect traffic, traffic control shall be provided for in accordance with Section 015526 “Traffic Control.”

D. “As-Built drawings” at project close-out according to Section 017700 “Closeout Procedures.”

1. Identify and accurately locate structures, inverts and line elevations, size and type of piping, location, size, and inverts for services.

1.5 QUALITY ASSURANCE

A. Test Results: All testing shall be performed in accordance with WSDOT/APWA Standards.

PART 2 - PRODUCTS

2.1 SUMMARY

A. All products shall conform to WSDOT/APWA Standards unless otherwise noted.

B. All materials shall be new and undamaged. The same manufacturer of each item shall be used throughout the work. All materials not specifically referenced shall comply with applicable sections of ANSI, ASTM, AWWA, the current WSDOT/APWA Standard Specifications and approved by the Engineer.

C. If required by the Engineer, the party responsible for the project shall furnish certification from the manufacturer of the materials being supplied that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of the reference standards.

2.2 MANHOLES

A. Manholes shall be constructed of pre-cast sections with confined O-ring rubber gasket joints, and with either a pre-cast base or a cast-in-place base in accordance with WSDOT/APWA Standards. Any request to deviate from these details is subject to the review and approval of the Engineer.

B. Manholes shall be constructed in accordance with AASHTO M-199 (ASTM C 478) unless otherwise shown on plans and approved by the Engineer. All pre-cast concrete and reinforced cast-in-place concrete shall be Class 4000. Non-reinforced concrete in channel and shelf shall be Class 3000. Concrete blocks may only be used for final adjustment of the casting to final street grade. Pre-cast bases shall be furnished with cutouts or knockouts. Knockouts shall have a minimum wall thickness of 2 inches.

C. Grouting:

1. All structures shall be grouted with non-shrink grout inside, outside, in-between sections and risers and under castings. Jet-Set shall not be used. All structures that are not watertight shall be re-grouted by and at the expense of the party responsible for the work until such structures are watertight.

D. All base reinforcing steel shall have a minimum yield strength of 60,000 psi and be placed in the upper half of the base with one inch minimum clearance.

2.3 MANHOLE RING AND COVER

A. Ductile iron rings and cast iron rings and covers shall conform to the current WSDOT/APWA Standard Specifications.

B. Manhole rings shall be gray iron conforming to the requirements of AASHTO M 105 Grade 30B. Manhole covers shall be ductile iron conforming to ASTM A536, GR 80-55-06, East Jordan Iron Works or an equivalent approved by the Engineer. Rings and covers shall be tested for accuracy of fit and shall be locked down with a 5-5/8 inch stainless steel socket head cap screws. All castings shall have a bituminous coating.

2.4 GRAVITY SEWER PIPE & FITTINGS

A. Sanitary sewer pipe shall be PVC or ductile iron meeting the following requirements unless otherwise directed by the Engineer:

1. Polyvinyl Chloride (PVC) sanitary sewer pipe and fittings shall conform to the requirements of ASTM D-3034 SDR-35 with joints and rubber gaskets conforming to ASTM D 3212. All pipes shall be clearly marked with the data of manufacture. All pipes shall be provided with a reference mark for proper spigot insertion. Joint gaskets shall be fabricated from a compound of which the basic polymer shall be a synthetic rubber consisting of styrene, butadiene, polyisoprene, or any combination thereof and shall meet the requirements of ASTM D-3212.
2. Ductile iron sewer pipe shall conform to ANSI A-21.51 or AWWA C-151 and shall be epoxy coated, push-on joint (Tyton joints only) or mechanical joint. Cement-lined ductile iron pipe shall not be used for sanitary sewer. The ductile iron pipe shall be Cass 52, unless otherwise approved by the Engineer.
3. AWWA C900 PVC pipe shall be pressure class 150 (SDR 18) unless otherwise approved by the Engineer. Pipe joints shall be manufactured using an integral bell with an elastomeric gasket push-on type joint. Elastomeric gaskets shall conform to ASTM F477. All fittings shall be PVC, compatible with C900 with respect to joint dimensions and physical properties.

2.5 SIDE SEWER

A. Side sewer service lines shall be PVC, ASTM D-3034 SDR-35, with flexible gasket joints. Depths greater than 14 feet shall be AWWA C900 or CL 52 epoxy coated DIP.

2.6 SIDE SEWER TRACER TAPE

A. Utility pipe tracer tape shall be detectable below ground surface and color coded. Tracer tape shall be detectable tape, up to 6 inches in width, and buried 24 inches to 48 inches below finished grades. The color of the tape for sanitary sewer shall be green with black printing reading “CAUTION SANITARY SEWER BURIED BELOW.” Tracer tape shall be “Lineguard Type II Detectable,” or an equivalent approved by the Engineer.

2.7 PLUGS

A. Plugs shall be able to withstand al test pressures without leakage. All plugs shall be approved by the Engineer.

2.8 CONCRETE

A. Concrete used for pads, thrust blocking, encasement, or slope anchor shall be mixed from materials acceptable to the Engineer and shall have a 30 day compressive strength of not less than 3,000 psi. The mix shall contain five (5) sacks of cement per cubic yard and shall be of such consistency that the slump is between 1 inch and 5 inches.

2.9 BEDDING MATERIAL

A. Bedding material shall be 3/8 inch minus manufactured washed pea gravel. Pipe bedding shall be 3/8 inch minus pea gravel meeting the requirements of Section 9-03.12 of the WSDOT/APWA Standard. Bedding will be to the pipe zone shown on WSDOT Standard Plan.

PART 3 - EXECUTION

3.1 SUMMARY

A. Work shall be in accordance with WSDOT/APWA Standards.

B. Drain grate installation shall be per manufacturer's instructions.

C. Elevation of existing sewer at all proposed connections shall be field verified by the contractor prior to installing upstream pipe. Contractor shall immediately notify engineer if verified elevations require change in design intent and requirements to construct.

3.2 FIELD QUALITY CONTROL

A. Tests shall be performed in accordance with WSDOT/APWA Standards.

B. The Contractor shall perform the tests under the direction and in the presence of the Owner.

END OF SECTION

SECTION 334000 – STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Installation of culvert pipe, storm drainage pipe, fittings, and structures.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 312000 – Site Earthwork
2. Section 312500 – Erosion and Sedimentation Control
3. Section 3341 00 – Subdrainage

1.3 REFERENCE DOCUEMENTS

A. All work in this section shall comply with Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, current edition, Sections 7-02 through 7-08, and other sections as specified or applicable.

B. WSDOT/APWA Standard Plans for Road, Bridge and Municipal Construction, Current Edition.

1.4 SUBMITTALS

A. Product Data: For pipe, fittings, structures, frame, grate/lid, and inlet/outfall protection rock.

B. Manufacturer’s Certification: Products meet or exceed specifications.

C. When operations affect traffic, traffic control shall be provided for in accordance with Section 015526 “Traffic Control.”

D. “As-Built drawings” at project close-out according to Section 017700 “Closeout Procedures.”

1. Identify and accurately locate structures; pipe size, line, and grade; and structures rim elevations.

1.5 QUALITY ASSURANCE

A. The Contractor shall video the completed piping system for inspection by the Owner.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials shall comply with the WSDOT/APWA Standard Specifications, unless specified herein.

2.2 PIPE MATERIALS

A. Pipe material, joints, and protective treatment shall conform to the requirements set forth in Section 9-05 of the WSDOT/APWA Standard Specifications.

B. Culvert pipe material shall comply with WSDOT/APWA Section 9-05.19 for corrugated polyethylene culvert pipe.

C. Roof drain lines material shall comply with WSDOT/APWA Section 9-05.1(5).

D. All other storm drain lines material shall comply with WSDOT/APWA Section 9-05.20.

E. Coupling bands shall be of the same material as the pipe.

F. Materials for concrete, rubber gaskets, metal castings, reinforcing steel, and masonry units shall meet the requirements of the appropriate sections of the WSDOT/APWA Standard Specifications.

2.3 CATCH BASINS

A. Catch basins shall be precast and shall conform to the dimensions shown in the plans. All precast concrete items shall meet the requirements of AASHTO M199.

B. Catch basin reinforcement shall be as set forth in the Plans.

C. The knockout diameter shall not be greater than 20 inches. Knockouts shall have a wall thickness of 2 inches minimum to 2.5 inches maximum. Provide a 1.5” minimum gap between the knout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar.

D. The precast base section may have a rounded floor. The walls may be sloped at a rate of 1:24 or steeper.

2.4 FRAMES/LIDS/GRATES/COVERS

A. Catch basin shall have locking vaned grates or solid covers as noted on the Plans.

B. Castings for metal frames for catch basins shall be cast steel, gray iron, or ductile iron.

C. Castings for metal grates for catch basins shall be cast steel or ductile iron.

2.5 CLEANOUTS

A. Cleanouts shall consist of a 6-inch wye or tee fitting and a vertical riser pipe. Within paved areas, the riser pipe shall be capped with a cast iron locking ring and cover encased in concrete. Within unpaved areas, a gasketed cap may be used in lieu of a cast iron cover.

2.6 PIPE INLET/OUTFALL PROTECTION

A. Inlet/outfall protection shall consist of 6” streambed cobbles comply with WSDOT/APWA Standard Specification Section 9-03.11(2), and geotextile for separation comply with WSDOT/APWA Section 9-33.

2.7 SCUPPER DECORATIVE COVER

A. The cover shall be Grade 304 stainless steel, gray iron, or ductile iron, with boltless locking system and shall conform to the minimum properties and characteristics as follows:

1. Certified to EN 1433 Load Class B
2. Meets AS 1428.2 (Clause 9c); AS 3996 (Clause 3.3.6)
3. Slip resistant
4. Solid cover, or with decorative pattern, any openings shall have maximum widths of ¼"

B. Coordinate with Owner on the pattern/design for approval.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of the drainage shall conform to the construction requirements specified in WSDOT/APWA Sections 7-05.3.

B. Installation of the drainage culverts shall conform to the construction requirements specified in WSDOT/APWA Section 7-02.3.

C. Installation of drainage pipe shall conform to the construction requirements specified in WSDOT/APWA Sections 7-01.3 and 7-08.3.

D. Streambed cobbles shall be placed for inlet/outfall protection in accordance with the plans. After placement, the quarry spalls shall be compacted to uniform density and unyielding.

E. Catch basin rims shall be installed or adjusted to match final grade.

F. The cover or grating of a manhole or catch basin shall not be grouted to final grade until the final elevation of the pavement, gutter, ditch, or sidewalk in which it is to be placed has been established, and until permission thereafter is given by the Owner to grout the cover or grating in place.

G. Lids, grates, and covers shall be seated properly to prevent rocking.

3.2 FIELD QUALITY CONTROL

A. The contractor shall be responsible for field quality control and testing in accordance with WSDOT/APWA Sections 2-03, 7-08 and other applicable sections. The Owner's Representative may perform quality assurance testing as determined by the Owner.

END OF SECTION

SECTION 334100 – SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Installation of subdrainage including trench excavation, bedding, subfloor drain pipe, footing drains, cleanouts, construction geotextile, and backfill.

1.2 RELATED SECTIONS

A. Related Sections include the following:

1. Section 312000 – Site Earthwork
2. Section 312500 – Erosion and Sedimentation Control
3. Section 334000 – Storm Drainage

1.3 REFERENCE DOCUEMENTS

A. All work in this section shall comply with Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) Washington State Chapter Standard Specifications for Road, Bridge, and Municipal Construction, current edition, Section 7-01, and other sections as specified or applicable.

B. WSDOT/APWA Standard Plans for Road, Bridge and Municipal Construction, Current Edition.

1.4 SUBMITTALS

A. Submit product data for pipe, fittings, and accessories for review and approval by Owner prior to delivery to site.

B. Submit manufacturer’s certification that products meet or exceed specifications for review and approval by the Owner prior to installation.

C. Submit gradation data and source of supply for bedding and backfill material for review and approval by Owner prior to delivery to site.

D. “As-Built drawings” at project close-out according to Section 017700 “Closeout Procedures.”

1. Identify and accurately locate structures; pipe size, line, and grade; and structures rim elevations.

1.5 QUALITY ASSURANCE

A. Owner or Owner's representative shall inspect and approve subsurface drainage installation prior to backfill.

PART 2 - PRODUCTS

2.1 SUMMARY

A. All products shall conform to the material requirements in Division 9 of the WSDOT/APWA Standard Specifications for Road, Bridge, and Municipal Construction, current edition.

2.2 SUBFLOOR UNDERDRAIN PIPE

A. 4-inch, 6-inch, AND 8-inch diameter perforated pipe shall meet the requirements of WSDOT/APWA Section 9-05.2.

2.3 FOOTING/FOUNDATION DRAINS

A. 4-inch diameter perforated pipe shall meet the requirements of WSDOT/APWA Section 9-05.2.

2.4 CLEANOUTS

A. Cleanouts shall consist of a 4-inch or 6-inch wye or tee fitting and a vertical riser pipe. Within paved areas, the riser pipe shall be capped with a cast iron locking ring and cover encased in concrete. Within unpaved areas, a gasketed cap may be used in lieu of a cast iron cover.

2.5 BEDDING AND BACKFILL

A. Gravel Backfill for Drains shall meet the requirements of WSDOT/APWA Section 9-03.12(4).

2.6 CONSTRUCTION GEOTEXTILE

A. Construction geotextile for underground drainage shall meet the requirements of WSDOT/APWA Section 9-33.2(1).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Work shall conform to the construction requirements specified in WSDOT/APWA Section 7-01.3.

B. Cast iron covers and caps for cleanout riser pipes shall be installed to match final grade.

C. Footing/foundation drains shall meet the construction requirements for underdrain pipe as described in WSDOT/APWA Section 7-01.3. Footing drains shall be installed at the base of building footings or slabs at the locations shown in the plans. Gravel backfill for drains shall be installed over footing drains to provide a minimum of 6-inches of vertical clearance between the bottom of the footing and the top of the backfill. Construction geotextile for underground drainage shall be wrapped, overlapping on top, to surround gravel backfill for drains.

END OF SECTION