PROJECT MANUAL

FOR

St. Helens Riverwalk

Project Number: P-525A

City of St. Helens
265 Strand Street
St. Helens, OR 97051

Volume 1
Divisions 01 - 41

BID

Prepared by:
Mayer/Reed, Inc.

SET NO._____

Civil

Specifications for

St. Helens Riverwalk

PROFESSIONAL OF RECORD CERTIFICATION:

Seal w/signature 	I certify the specifications section(s) listed below are applicable to the design for the subject project for St. Helens Riverwalk. These specifications were prepared by me or under my supervision. Section(s): 01 57 13-Temporary Erosion and Sediment Control 02 41 00-Demolition 31 10 00-Site Clearing 31 23 16.13-Trenching 33 01 10.58-Disinfection of Water Utility Piping Systems 33 05 61-Concrete Manholes 33 14 16-Site Water Utility Distribution Piping 33 41 00-Subdrainage 33 42 11-Stormwater Gravity Piping 33 42 30-Stormwater Drains 33 46 00-Stormwater Management

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

Mayer/Reed

Specifications for

St. Helens Riverwalk

PROFESSIONAL OF RECORD CERTIFICATION:

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Architecture

Specifications for

St. Helens Riverwalk

PROFESSIONAL OF RECORD CERTIFICATION:

Seal w/signature 7.14.23	I certify the specifications section(s) listed below are applicable to the design for the subject project for St. Helens Riverwalk. These specifications were prepared by me or under my supervision. Section(s): 03 05 16 - Underslab Vapor Barrier 07 25 00 - Weather Barriers 07 42 13 - Metal Roof and Wall Panels 07 42 33 - Exterior Solid Phenolic Wall Panels 07 54 23 - Thermoplastic Polyolefin (TPO) Membrane Roofing 07 62 00 - Sheet Metal Flashing and Trim 07 92 00 - Joint Sealants 08 11 13 - Hollow Metal Doors and Frames 08 71 00 - Door Hardware 08 80 00 - Glazing 09 90 00 - Painting and Coating 09 96 00 - High-Performance Coatings 10 81 13 - Bird Control Devices

FINAL ELECTRONIC DOCUMENT AVAILABLE UPON REQUEST

Structural

Specifications for

St. Helens Riverwalk

PROFESSIONAL OF RECORD CERTIFICATION:

Seal w/signature STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 79,377PE Sean Clark Sean Clark 2023.05.03 13:28:52-07'00' OREGON SEP 13, 2011 SEAN M. CLARK RENEWS: 12-31-2023	I certify the specifications section(s) listed below are applicable to the design for the subject project for St. Helens Riverwalk. These specifications were prepared by me or under my supervision. Section(s): 05 12 00 – Structural Steel Framing 05 50 00 – Metal Fabrications 06 10 00 – Rough Carpentry 06 18 00 – Glued-Laminated Construction 31 36 00 – RIB-Gabions 32 32 34 – Reinforced Soil Retaining Wall

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PAE

Specifications for

St. Helens Riverwalk

PROFESSIONAL OF RECORD CERTIFICATION:

Seal w/signature	I certify the specifications section(s) listed below are applicable to the design for the subject project for St. Helens Riverwalk. These specifications were prepared by me or under my supervision.
REGISTERED PROFESSIONAL ENGINEER 92043PE OREGON SEPTEMBER 12, 2014 ROBERT L. SMITH 05/09/2023 EXPIRES 06-30-2024	Section(s): **DIVISION 26 -- ELECTRICAL** 26 05 00 - Common Work Results for Electrical 26 05 19 - Low-Voltage Electrical Power Conductors and Cables 26 05 26 - Grounding and Bonding for Electrical Systems 26 05 29 - Hangers and Supports for Electrical Systems 26 05 33.13 - Conduit for Electrical Systems 26 05 33.16 - Boxes for Electrical Systems 26 05 53 - Identification for Electrical Systems 26 05 83 - Wiring Connections 26 09 23 - Lighting Control Devices 26 09 93 - Sequence of Operations for Lighting Controls 26 24 16 - Panelboards 26 27 26 - Wiring Devices 26 50 00 - Lighting 26 56 00 - Exterior Lighting

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SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: St. Helens Riverwalk

B. Owner's Name: City of St. Helens.

C. Owner's Representative's Name: Mayer/Reed, Inc..

D. Construction Manager's Name: Otak, Inc.

1.02 GENERAL

A. These general requirements, special provisions, and technical specifications supplement and amplify certain sections of the Standard Terms and Conditions for Public Improvement Contracts, and Supplementary General Conditions. These specifications shall apply in all particulars insofar as they are applicable to this project. In the case of discrepancy, unless noted herein, the more restrictive provisions shall apply.

1.03 SCOPE OF WORK

A. The Project consists of the construction of St. Helens Riverwalk, amphitheater stage, pavilion, playground, and other associated pathways, retaining walls, railings, furnshings and signage..

B. The general outline of the principal features of the work does not in any way limit the responsibility of the Contractor to perform all work and furnish all equipment, labor, and materials necessary to successfully complete the work required by the Contract Documents. The Contractor shall not change any material, design values, or procedural matters stated or approved herein, without informing the Owner and receiving written approval of the change. Unapproved changes shall be considered unauthorized work and shall result in rejection and removal of work done with the unapproved materials or with an unapproved process at no cost to the Owner.

1.04 LOCATION OF WORK

A. Work on this project is located within the city limits of St. Helens, Oregon as shown on the vicinity map on Sheet G0.01 of the project plans.

1.05 INTENT OF WORK

A. The intent of the Work is to produce a complete and finished work, which the Contractor undertakes to do in full compliance with the Contract Documents. It is not intended to mention every item of work in the specifications that can be adequately shown on the drawings nor to show on the drawings all items of work described or required by the specifications. All materials or labor for work shown on the drawings or reasonably inferable therefrom as being necessary to produce a finished job shall be provided by the Contractor whether not it is expressly covered in the specifications. The Contractor shall do all work as provided in the plans, specifications, special provisions, bid and contract, and shall do such additional extra work as may be considered necessary to complete the work in a satisfactory manner acceptable to the Owner.

1.06 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract City of St. Helens Public Improvement contract.

1.07 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.

B. Scope of alterations work is indicated on drawings.

C. Contractor is required to remove and deliver the following to Owner prior to start of work:
   1. Play Equipment.
   2. Dog Statue Sign.

D. Contractor is required to remove and store the following prior to start of work, for later reinstallation by Contractor:
   1. Splash Pad Water Vault & Activation Button.
   2. Concrete Bench.
   3. Dog Statue.

1.08 WORK BY OWNER

A. Owner will supply and install the following:
   1. Picnic Tables.

B. Owner will supply the following for installation by Contractor:
   1. Canoe.
      a. Contractor will modify canoe for installation per the Drawings.

1.09 FUTURE WORK

A. Project is designed to accommodate future extension of the Riverwalk to the south.

1.10 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent portions of the site during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.11 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
   1. Locate and conduct construction activities in ways that will limit disturbance to site.

B. Arrange use of site and premises to allow:
   1. Work by Others.
   2. Work by Owner.

C. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Time Restrictions:
   1. Limit conduct of the hours of 8:00 AM - 5:00 PM.
   2. General working hours in the City is 8:00 am - 5:00 pm, Mon-Fri excepting weekends and legal holidays. When working on City infrastructure, working hours are 8:00 am to 4:30 pm. The City's Noise Ordinance 2405 regulates excessive noise, and Ordinance 2861 amends 2405 for construction noise limits

1.12 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner, Construction Manager and Owner's Representative

1.13 ROLES AND RESPONSIBILITIES

A. Owner / City: City of St. Helens
   1. The Owner has full authority over the Work and shall identify a representative or representatives to act on its behalf with respect to the project.
   2. The Owner is referred to as "Owner" and "the City" interchangably throughout the contract documents.

B. Contract Manager: City of St. Helens
   1. Signs pay requests
   2. Authorizes change orders

C. City Project Manager: City of St. Helens
   1. Main point of contact
   2. Manages bidding process, prepares and posts bid package, maintains planholders list.
   3. Maintains submittal and RFI logs
   4. Coordinates OAC meetings
   5. Prevailing wage monitoring

D. Construction Manager: Otak, Inc.
   1. Reviews bids and provides recommendation of award to the City.
   2. Reviews preliminary contractor submittals.
   3. Reviews contractor schedules.
   4. Attends all OAC meetings, prepares and distributes meeting notes
   5. Responds to daily construction issues and research with appropriate parties to resolve issues.
   6. Authorizes minor variations in the work which do not involve adjustments to Contractor's price nor time for construction.
   7. Documents materials as they are installed and track quantities through each month to very and confirm construction contractor invoices.
   8. Included on all RFIs & Submittals

E. Lead Inspector: Otak, Inc.
   1. On-site inspector to monitor the Contractor's quality control process for compliance with the construction contract requirements.
   2. Coordinates with Secondary Inspector
   3. Prepares progress reports and photos of construction activity for each day on site.
   4. Identifies work not in accordance with the contract or otherwise defective, brings these issues to the attention of the Contractor and the City.
   5. Monitors corrective activity.

F. Erosion Control Inspector: City of St. Helens

G. Secondary Inspector: City of St. Helens
   1. Attends all OAC meetings
   2. Included on RFIs & Submittals

H. Owner's Representative: Mayer/Reed, Inc.
   1. Assists with bid inquiries and develops bid addenda, as needed.
   2. Attends all OAC meetings
   3. Manages design team invoicing
   4. Manages design services during construction, including responses to RFIs & submittals, site visits, and as-built drawings

I. Geotechnical Engineer: NV5, Inc.
   1. Performs geotechnical inspection services to confirm that subsurface conditions are consistent with site explorations and that earthwork activities are conducted in accordance with the intents of the project plans and specifications.

J. County: Columbia County

K. Sewer District: City of St. Helens

L. Water District: City of St. Helens

M. Gas Company: Northwest Natural Gas

N. Power Company: C0lumbia River PUD

O. Telephone Company: Lumen

P. Cable Company: Comcast Cable

Q. Fire Department: Columbia River Fire & Rescue.

1.14 CONTRACTOR'S AUTHORITY AND RESPONSIBILITIES

A. The Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall ensure the completed work complies with the Contract Documents and shall supervise, direct, and control the work competently and efficiently. Contractor shall devote such attention thereto and applying such skill and expertise as necessary to perform the work in accordance with the Contract Documents and shall provide competent, qualified personnel to survey and lay out the work and to perform construction as required by the Contract Documents.

B. The Contractor shall do all work and furnish all labor, materials, equipment, tools, and machines necessary for the performance and completion of the project in accordance with Contract Documents within the specified time. Materials and construction details of forms, shoring, false work, and other structures built by the Contractor but not a part of the permanent project, shall meet approval of the Owner, but such approval shall not relieve the Contractor from responsibility for their safety and efficiency.

C. The City shall not be liable or responsible for any accident, loss, or damage happening to work referred to in the Contract Documents prior to completion and acceptance thereof.

D. Contractor shall at all times maintain good discipline and order at the site. At the written request of the Owner, the Contractor shall immediately remove from the project any employee or representative of the Contractor or a subcontractor who, in the opinion of the Owner, does not perform work in a proper and skillful manner or who is disrespectful, intemperate, disorderly, uncooperative, or otherwise objectionable.

E. Such person shall not be employed again on the work. The Contractor, acting through an approved designated superintendent, shall give personal attention to and shall manage the work to the end that it shall be prosecuted faithfully. When the superintendent is not personally present at the job site, an alternate previously designated representative shall be available and shall have the authority to act on the Contract.

F. The Contractor alone shall at all times be responsible for the safety of his and his subcontractor's employees.

1.15 COMPETENT PERSON DESIGNATION

A. The Contractor shall designate, in writing, a qualified and experienced competent superintendent at the site whose duties and responsibilities shall include the enforcement of Oregon - OSHA regulations regarding excavations, the prevention of accidents, and the maintenance and supervision of construction site safety precautions and programs. The Superintendent must be experienced with the work being performed and capable of reading and understanding the Contract. The Contractor shall ensure the Superintendent is available at all times and able to receive instructions from the Owner or authorized representatives and to act for the Contractor. The Owner may suspend work without suspending working day charges if a Superintendent is not available or does not meet the above criteria. The designated superintendent shall not be replaced without written notice to Owner except under extraordinary circumstances. An alternate representative may be designated. The alternate representative shall be present at the site whenever Work is in progress. Any order or communication given to this representative shall be deemed delivered to the Contractor.

B. In the absence of the Superintendent or his designated representative, necessary or desirable directions or instructions may be given by the Owner to the superintendent or foreman having charge of the specific Work to which the order applies. Such order shall be complied with promptly and referred to the Contractor or his representative. The designated Superintendent will act as the Contractor's representative and shall have the authority to act in all matters relating to this Contract. The superintendent shall have full authority to carry out all the provisions of the Contract and to supply materials, equipment, tools, and labor without delay. Any Superintendent or alternate Superintendent who repeatedly fails to follow the Owner's written or oral orders, directions, instructions, or determinations, shall be subject to removal from the Project.

1.16 EMERGENCY MAINTENANCE SUPERVISOR

A. The Contractor shall submit to the Owner the names, addresses and telephone numbers of at least three employees responsible for performing emergency maintenance and repairs when the Contractor is not working. These employees shall be designated, in writing by the Contractor, to act as its representatives and shall have full authority to act on its behalf. At least one of the designated employees shall be available for a telephone call any time an emergency arises with a maximum of one hour allowed to return phone call.

B. The Contractor will be responsible for reimbursing the City for all costs incurred by the City for performing emergency maintenance and repairs when the Contractor does not respond to the emergency calls or does not complete the emergency maintenance or repair.

1.17 SPECIFICATION SECTIONS APPLICABLE TO EVERY CONTRACT

A. Unless otherwise noted, provisions of the sections listed below apply to every contract. Specific items of work listed under individual contract descriptions constitute exceptions.

B. Section 01 20 00 - Price and Payment Procedures.

C. Section 01 21 00 - Allowances.

D. Section 01 22 00 - Unit Prices.

E. Section 01 25 00 - Substitution Procedures.

F. Section 01 30 00 - Administrative Requirements.

G. Section 01 32 16 - Construction Progress Schedule.

H. Section 01 35 53 - Security Procedures.

I. Section 01 35 70 - Buy America Certification Procedures.

J. Section 01 40 00 - Quality Requirements.

K. Section 01 42 16 - Definitions.

L. Section 01 50 00 - Temporary Facilities and Controls.

M. Section 01 60 00 - Product Requirements.

N. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

O. Section 01 70 00 - Execution and Closeout Requirements.

P. Section 01 74 19 - Construction Waste Management and Disposal

Q. Section 01 78 00 - Closeout Submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 10 00

SECTION 01 10 10
COORDINATION OF WORK

PART 1 GENERAL

1.01 COORDINATION OF CONTRACT DOCUMENTS

A. Drawings and specifications are intended to describe and provide for a complete work. Any requirement in one is as binding as if stated in all. The Contractor shall provide any work or materials clearly implied in the Contract Documents even if the Contract Documents do not mention it specifically. If there is a conflict within the Contract Documents, it will be resolved by the following order of precedence:
   1. Contract change orders

B. Addenda to Contract Documents
   1. Technical Specifications & Special Provisions
   2. Bidding Rules and Contract Documents
   3. Plan drawings specifically applicable to the Project and bearing the Project title
   4. Contractor's Approved Proposal
   5. Outside agencies permits/requirements as may be required by law or loan agreements
   6. General and Supplementary Conditions of the Contract
   7. Standard Drawings
   8. Reference Specifications

C. Change Orders, supplemental agreements, and approved revisions to Contract Drawings and specifications will take precedence over documents listed above. Detailed plans shall have precedence over general plans. Dimensions shown on Contract Drawings of that which can be computed shall take precedence over scaled dimensions. Notes on drawings are part of the drawings and govern in the order described above. Notes on drawings shall take precedence over drawing details. The intent of the drawings and specifications is to prescribe the details for the construction and completion of the work which the Contractor undertakes to perform according to the terms of the Contract.

D. Where the drawings or specifications describe portions of the work in general terms, but details are incomplete or silent, it is understood that only the best general practice is to prevail and that only materials and workmanship of the best quality are to be used. Unless otherwise specified, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals, and do all the work involved in executing the Contract in a manner satisfactory to the City.

E. Contract Drawings for the project are designated by general title, sheet number and sheet title. The specific titles of each sheet are contained on Sheet G-1 in of the Contract Drawings. When reference is made to the drawings, the "Sheet Number" of the drawing will be used. Each drawing bears the general title, ST. HELENS RIVERWALK, Project No. P-525A.

1.02 CONFORMITY WITH PLANS AND SPECIFICATIONS

A. Contractor shall furnish materials and perform work in reasonably close conformity with the lines, grades, cross-sections, dimensions, details, gradations, physical and chemical characteristics of materials, and other requirements shown in the Contract. Reasonably close conformity limits will be as defined in the respective items of the Contract or, if not defined, as determined by the Owner's Representative. Contractor shall obtain approval before deviating from the plans and approved working drawings. The Contractor shall not performwork beyond the lines and grades shown on the plans or any extra work without prior approval from the Owner and Owner's Representative. Work performed beyond the lines and grades shown on the plans or any extra work performed without prior approval from the Owner and Owner's Representative is considered unauthorized and shall be excluded from pay consideration. The City will not pay for materials rejected due to improper fabrication, excess quantity, or any other reason within the Contractor's control.

1.03 NOTIFICATION OF UTILITIES AND AGENCIES

A. Utility locations shown on Contract Drawings are approximated. Contractor shall secure utility locates and pothole all known utility locations to determine utility depths prior to the

commencement of any construction as needed. Before starting any site work, Contractor shall call One Call at 1-800-332-2444 for utility locates and to notify utility agencies. The Contractor is responsible for verifying the locations of all existing utilities prior to work. All excavators performing work on this project must comply with all the provisions of ORS 757.541 to 757.571, including notification of all owners of underground utilities at least forty-eight (48) business day-hours, but not more than ten (10) business days before commencing an excavation. Existing utilities, even if not specifically shown on the Contract Drawings or addressed in this document, that are damaged or disturbed by construction shall be restored and/or replaced to the original condition and up to the satisfaction of the utility owner at the Contractor's expense. In the event of damage to power, gas, telephone or any other underground utility system, the Contractor shall make available to the utility owner any manpower or equipment that will facilitate the repair and the continuation of scheduled work. All cost of repairs shall be the responsibility of the Contractor.

B. Before exposing any utility, the utility having jurisdiction shall grant permission and be provided the opportunity to oversee the operation, with advance notice provided as the individual utility requires. Should service of any utility be interrupted due to the Contractor's operation, the proper authority shall be notified immediately. It is of the utmost importance that the Contractor cooperates with the said authority in restoring the service as promptly as possible. Any costs shall be borne by the Contractor.

C. Utilities which may be impacted include the following:
   1. Streets City of St. Helens
   2. Watermain City of St. Helens
   3. Storm Sewer City of St. Helens
   4. Sanitary Sewer City of St. Helens
   5. Natural Gas Northwest Natural Gas
   6. Power/Electricity Columbia River PUD
   7. Telephone Lumen
   8. Cable Company Comcast

D. Contractor shall be responsible for the scheduling and coordination of the construction activities necessary to support the resolution of any utility conflicts with the appropriate utility agency. The City will not incur any financial responsibility for any construction delays related to the relocation of any utilities. If the Contractor fails to locate any known utility that interferes with construction, the cost of correcting the conflict shall be borne by the Contractor. Contractor shall be responsible for prompt notification to the City and the appropriate utility agencies of any known utility conflicts. Contractor shall give at least five (5) business days' notice to the City or utility agency if a conflict arises and relocation of an existing utility is necessary. In areas where the Contractor's operations are adjacent to or near a utility and such operations may cause damage which might result in significant expense, loss and inconvenience, the operations shall be suspended until all arrangements necessary for the protection thereof have been made by the Contractor. There will be no separate payment made for the verification of utility depths or maintenance of utility markings and the costs thereof shall be considered incidental to construction.

1.04 COORDINATION WITH UTILITIES AND OTHER CONTRACTORS

A. It is the Contractor's responsibility to coordinate work with utility owners. The Contractor shall use established safety practices when working near utilities and shall consult with the appropriate utilities before beginning work. Contractor shall notify the Owner immediately of utility conflicts. The Owner will decide whether to adjust utilities or adjust the work to eliminate or lessen the conflict. Unless otherwise shown on the plans, the Contractor will make necessary arrangements with the utility owner when utility adjustments are required. Contractor shall use work procedures that protect utilities or appurtenances that remain in place during construction, cooperate with utilities to remove and rearrange utilities to avoid service interruption or duplicate work by the utilities, and allow utilities access to the right of way. Contractor shall immediately notify the appropriate utility of service interruptions resulting from damage due to construction activities.

B. The following table lists the utility contacts during the period of the Contract. This information is subject to change at any time without prior notification:

Utility	Owner	Contract
Streets	City of St. Helens	Sharon Darroux, sharon@sthelensoregon.gov; 503-366-8243
Water, Sewer, Storm	City of St. Helens	Dave Elder, delder@sthelensoregon.gov; 503-936-8523
Natural Gas	Northwest Natural Gas	Curtis Babcock, curtis.babcock@nwnatural.com; 971.352.5166
Power	Columbia River PUD	Brooke Sisco, bsisco@crpud.org, 503-366-3261
Telephone	Lumen/Century Link	Don Sheeran, donald.sheeran@lumen.com; 503-422-0483
Cable	Comcast	Ryan Hennessey, Ryan_Hennessey@cable.comcast.com, 360-846-8734

1.05 SITE INVESTIGATION AND PHYSICAL DATA

A. The Contractor acknowledges that it is satisfied as to the nature and location of the work and the general and local conditions, including but not limited to those bearing upon transportation, disposal, handling, and storage of materials. The Contractor shall verify all dimensions, quantities, and details shown on the Plans, Supplementary Drawings, Schedules, Specifications, or other data received from the Owner, and shall notify the Owner of all errors, omissions, conflicts, and discrepancies found therein. The Contractor shall assume all responsibility for making estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract. Any failure by the Contractor to become acquainted with the available information and existing conditions will not be a basis for relief from successfully performing the work and will not constitute justification for additional compensation. The Contractor shall verify the locations existing of structures, pipelines, grades, and utilities as needed, prior to construction. The City assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available. Information and data furnished or referred to herein is furnished for information only.

1.06 MEANS AND METHODS OF CONSTRUCTION

A. Unless otherwise expressly provided in the Contract Documents, the means and methods of construction shall be such as the Contractor may choose; subject, however, to the Owner’s right to prohibit means and methods proposed by the Contractor which in the Owner's judgment:
   1. shall constitute a hazard to the work, or to persons or property, or shall violate express requirements of applicable laws or ordinances; or
   2. shall cause unnecessary or unreasonable inconvenience to the public; or
   3. shall not produce finished work in accordance with the requirements of the Contract documents; or
   4. shall not assure the work to be completed within the time allowed by the Contract.

B. The Owner’s approval of the Contractor’s means or methods of construction, or the Owner’s failure to exercise Owner’s right to prohibit such means or methods, shall not relieve the Contractor of its responsibility for the work or of its obligation to accomplish the result intended by the Contract Documents; nor shall the exercise or non-exercise of such rights to prohibit create a cause of action for damages or provide a basis for any claim by the Contractor against the City. Where the Contract Documents do not require the use of specific means or methods for the Work, the Contractor shall submit its proposed means and methods of construction to the Owner and Owner's Representative sufficiently in advance of the work affected to permit a reasonable time for review and comments. The means and methods of construction must be approved in advance by the Owner before construction begins. Failure to submit the proposed

plan within a reasonable time shall not create a claim for damages for resulting delay in the work or for damages, nor shall it be a cause for extension of working time to complete the work. Contractor further agrees to defend and indemnify City for any claim or cause of action brought by any third party against the City.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 10 10

SECTION 01 20 00
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Change procedures.

C. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements.

B. Section 01 21 00 - Allowances: Payment procedures relating to allowances.

C. Section 01 22 00 - Unit Prices: Payment and modification procedures relating to unit prices.

D. Section 01 78 00 - Closeout Submittals: Project record documents.

1.03 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Owner for approval.

B. Forms filled out by hand will not be accepted.

C. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

D. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.

E. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS AND RETAINED AMOUNTS

A. Progress Payments

1. On a monthly basis, during performance of the work, the Contractor shall prepare an estimate of the value of Contract work completed on a form approved by the City and submit to the Project Manager. Applications for payment will be reviewed and processed by the City in accordance with the applicable provisions of the Contract Documents. The pay application shall also provide such supporting documentation as the City or the other applicable provisions of the Contract Documents may require. Certified payroll must be submitted for review with or prior to pay application submittal.
2. It is understood that the monthly estimates shall be approximate only, and all monthly estimates and partial payments shall be subject to correction in the estimate rendered following the discovery of an error in any previous estimate, and such estimate shall not in any respect be taken as an admission of the City of the amount of work done or of its quality or sufficiency nor as an acceptance of the work or the release of the Contractor of any of its responsibility under the Contract.
3. Payment shall be made by the City about thirty (30) days after receipt of the pay request. The City shall not be liable for interest on any late or delayed payment caused by any claim or dispute, any discrepancy in quantities, any failure to provide supporting documentation or other information required with the estimate or as a precondition to payment under the Contract, or due to any payment the City has a right to withhold under the Contract.

B. Retained Amounts

1. The City shall retain five percent (5%) of the amount earned on all progress payments. Monies retained will be released to Contractor following Final Acceptance of the Work by the City. Contractor's monthly payment applications and invoices shall include retainage as a line item.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Owner for approval.

D. Forms filled out by hand will not be accepted.

E. Execute certification by signature of authorized officer.

F. Submit one electronic copy of each Application for Payment.

1.05 FIELD DOCUMENTATION OF BID ITEM QUANTITIES

A. Daily Bid Item Logs shall be the basis of recording and documenting all pay quantities. The Construction Inspector is responsible for ensuring that all quantity measurements are made and documented in accordance with the Contract Documents. Bid quantity entries, including supporting documentation, serve as both partial and final verification that correct payments are made on all pay applications and invoices.

B. The Contractor's foreman or superintendent shall sign the daily bid item log receipts in the possession of the City Construction Inspector for Contract Bid Items completed as specified. The bid item log shall be signed by both the City Construction Inspector and the Contractor's authorized representative within 24 hours of completion of bid items that meet specifications. It is the responsibility of the Contractor to ensure the log is signed daily for the work completed. At a minimum, the bid item log shall contain the following: Bid item reference number, location of work, stationing of construction, description of work, quantity of work completed, and plan sheet reference number.

C. The Contractor will be provided a copy of all bid item logs. The Contractor's pay applications and invoices shall be equal to the bid items signed for and no more and shall reference bid item log receipt number on the appropriate pay request. Final quantities to be adjusted per project as-builts.

1.06 PAYMENT FOR EXTRA WORK

A. Extra Work done by the Contractor, as authorized and approved by the City, shall be compensated for in the manner described in Section 01 25 00 - Substitution Procedures. The compensation provided for Extra Work done by the Contractor constitutes full and final payment for the cost of the Extra Work, which cost is limited to:

1. All reasonable costs of labor, materials, supplies, tools, equipment or machinery rental, power, fuel, lubricants, water and other similar operation expenses for the time that such of the above things are employed or used on such Extra Work and approved in writing by the Project Manager; and
2. Costs shall be considered to cover and compensate the Contractor for profit, overhead, profit-and-overhead markups charged to Contractor by subcontractors and suppliers, general supervision, field office expense and all other elements of cost and expense not embraced within the cost of the Extra Work as described in this Section. No cost of off-site storage shall be included in the above description of cost unless off-site storage has been approved and directed by the City in writing. No other claims or reservations of right as to additional costs, prices, markups, disallowed costs or other future additional money or time shall be accepted; each change order shall be specific and final.

B. The method of determination and payment of cost, or credit to the City for any Extra Work shall be one of the following:

1. Unit prices agreed on in writing and executed by the City before the Extra Work is commenced or unit prices already included in the Contract Documents, subject to all other conditions of the Contract. Mutual acceptance of a not-to-exceed lump sum properly itemized and supported by sufficient substantiating data to permit evaluation before the Extra Work is commenced, subject to all other conditions of the Contract.
2. A not-to-exceed cost to be determined in a manner agreed upon by the parties plus a mutually acceptable fixed or percentage fee, agreed upon before the Extra Work is

commenced and subject to all other conditions of the Contract.

3. The force account method provided in these Contract Documents.
4. Signed, daily reports in duplicate of the extra work to be paid for on a force account basis, shall be furnished to the Construction Manager by the Contractor. Materials used will be itemized and direct cost of labor and charges for equipment rental will be furnished by the Contractor or Subcontractor. The Contractor will provide names, identifications, and classifications of workmen, the hourly rate of pay and hours of work, and the size, type, and identification number of equipment and hours of equipment operation.
5. Material charges shall be substantiated by vendors' invoices with copies of such invoices submitted with the reports, or, if not available, submitted with subsequent reports. In the event said vendors' invoices are not submitted within 15 days after completion of the work, the City reserves right to establish the cost of such materials at the lowest current price at which said materials are available in the quantities concerned, delivered to the location of the work. The Owner's Representative will compare their records with the reports furnished by the Contractor, make any necessary adjustments, and compile the cost of extra work paid for on a force account basis on forms furnished by the Owner. When these extra work reports are agreed upon and signed by both parties, they shall become the basis of payment for the work performed.

1.07 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Construction Manager will issue instructions directly to Contractor.

B. For other required changes, Construction Manager will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
   1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
   2. Promptly execute the change.

C. For changes for which advance pricing is desired, Owner will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 15 days.

D. Contractor may propose a change by submitting a request for change to Owner's Representative, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.

E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

F. Substantiation of Costs: Provide full information required for evaluation.

G. Execution of Change Orders: Construction Manager will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

I. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

1.08 PAYMENT WITHHELD

A. In addition to express provisions elsewhere contained in the Contract, the City may withhold from any payment otherwise due the Contractor such amount as determined necessary to protect the City’s interest, or, if it so elects, may withhold or retain all or a portion of any payment or refund payment on account of:

1. Unsatisfactory progress of the work not caused by conditions beyond the Contractor's control
2. Defective work not corrected
3. Contractor's failure to carry out instructions or orders of the Owner or its representative,
4. Work or execution thereof is not in accordance with the Contract documents
5. Claim filed by or against the Contractor or reasonable evidence indicating probable filing of claims
6. Failure of the Contractor to make payments to any subcontractor or suppliers for material or labor used in the performance of the Work
7. Unsafe working conditions allowed to persist by the Contractor

B. When the grounds for withholding payment are removed, payment shall be made for amounts withheld because of them, and City shall not be liable for interest on any delayed or late payment.

1.09 APPLICATION FOR FINAL PAYMENT

A. After receiving the Certificate of Final Completion, the Contractor shall submit a final application for payment in accordance with the provisions of the Contract. Final pay application shall identify total adjusted Contract Sum, previous payments and sum remaining due.

B. The amount of final payment will be the difference between the total amount due to the Contractor and the sum of all payments previously made. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. After computation of the final amount due, and after Final Acceptance of the Project, final payment will be mailed to the Contractor's last known address as shown in the records of the City.

C. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

D. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 70 00.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 20 00

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Inspecting and testing allowances.

B. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 INSPECTING AND TESTING ALLOWANCES

A. Costs Included in Inspecting and Testing Allowances: Cost of engaging an inspecting or testing agency; execution of inspecting and tests; and reporting results.

B. Costs Not Included in the Inspecting and Testing Allowances:
   1. Costs of incidental labor and facilities required to assist inspecting or testing agency.
   2. Costs of testing services used by Contractor separate from Contract Document requirements.
   3. Costs of retesting upon failure of previous tests as determined by Owner's Representative.

C. Payment Procedures:
   1. Submit one copy of the inspecting or testing firm's invoice with next application for payment.
   2. Pay invoice on approval by Owner's Representative.

D. Differences in cost will be adjusted by Change Order.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 21 00

SECTION 01 22 00
UNIT PRICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Unit price procedures.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.02 RELATED REQUIREMENTS

A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.04 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.05 MEASUREMENT AND PAYMENT OF CONTRACT BID ITEMS

A. Measurement and Payment of Contract Bid Items shall be on a unit price basis in accordance with the prices set forth in the Contract for individual work items. Where work is required but does not appear as a separate item in the Contract, the cost for that work shall be included and absorbed in the unit prices named in the Contract. No payment or compensation shall be made for bid items that are not completed. Only payment for actual work completed will be made regardless of how the Contractor balances bid. Contractor shall make a careful assessment when preparing bid. The City may add and/or delete bid item quantities during construction. The term “Lump Sum” when used as an item of payment will mean full compensation for the Work described in the Contract Documents. The unit will be construed to include all necessary fittings and accessories. Payments for Lump Sum items will be made in proportion to the amount of Work accomplished as determined by the Owner as of the “period ending date” of each Partial Payment Estimate. Contractor shall provide a schedule of values for each lump sum item. The Unit Price and Lump Sum price for furnishing each item of Work listed in the Contract Price shall include all labor, materials, tools, equipment, superintendence, and incidentals necessary to perform and complete the Work, including profit, overhead costs, permit and license fees, royalties, and applicable taxes and fees.

1.06 MOBILIZATION, BONDS, INSURANCE, AND DEMOBILIZATION

A. Payment for Mobilization, Bonds, Insurance and Demobilization shall be paid for at the Contract lump sum price as stated in the Schedule of Bid Prices of the Contract Documents for this project under “Mobilization, Bonds, Insurance and Demobilization” and shall include full compensation for the work involved as described herein and no additional allowance will be made.

B. Mobilization, Bonds, Insurance, and Demobilization typically includes, but is not limited to, the preparation of contract; completion of all tasks and submittal of all documents (bonds, insurance, schedule, etc.) required as a condition of issuing the Notice to Proceed; moving onto the site(s) all Contractor’s equipment and materials required; installing and maintaining temporary buildings or trailers; providing power, utilities, lighting, fencing, etc. as may be required; providing all on-site communications equipment or facilities; obtaining all permits; permit fees; having all OR-OSHA required notices posted, establishment of a safety program; preparing and delivering all pre-construction notices and/or job signs; arrangement of markings and plan for verification (potholing) of existing facilities; and beginning work on the project; removing all equipment, unused materials, all temporary facilities, job trailers, final clean up,

and any other items, facilities, tools or materials left behind by the Contractor at the completion of the work.

C. The amounts paid for Mobilization, Bonds, Insurance, and Demobilization will be based on the percent of the original Contract amount that is earned from other Contract bid items, not including advances on materials, as follows:
   1. When 5% of the Contract is earned, either 50% of the amount for “Mobilization, Bonds, Insurance, and Demobilization” or 5% of the original Contract amount, whichever is least.
   2. When 10% of the Contract is earned, either 100 percent of “Mobilization, Bonds, Insurance, and Demobilization” or 10% of the original Contract amount, whichever is the least.
   3. When all work is completed, amount of “Mobilization, Bonds, Insurance, and Demobilization” exceeding 10% of the original Contract amount.

D. This schedule of “Mobilization, Bonds, Insurance, and Demobilization” progress payments will not limit or preclude progress payments otherwise provided by the Contract. Payment shall represent full compensation for all mobilization costs including, but not limited to, mobilization, bonds, insurance, and demobilization.

1.07 TEMPORARY WORK ZONE TRAFFIC CONTROL

A. Measurement for Temporary Work Zone Traffic Control shall be as stated in the Schedule of Bid Prices of the Contract Documents for this project under “Temporary Work Zone Traffic Control, Complete”, and shall be made on a lump sum basis and include all work to meet requirements of these Contract Documents.

B. Payment for furnishing and installing temporary work zone traffic control will be made as percentage complete of contract per construction phase and shall include full compensation for furnishing, installing, moving, operating, maintaining, inspecting, and removing traffic control devices throughout the project area according to the standard drawings, the traffic control plan (TCP) for the Project or as directed, and includes all labor, materials, tools, equipment, incidentals, and for performing all work involved in preparing and submitting traffic control plans, providing, placing, maintaining, and removal of traffic control signs and safety equipment, temporary relocation of existing regulatory signs, changeable message boards, project and public notification signs, flagging, transportation of flaggers and equipment, coordination efforts, and any other items necessary for vehicle and pedestrian traffic control per the Manual on Uniform Traffic Control Devices, and as specified in these Contract Documents, and no additional allowance will be made.

1.08 EROSION AND SEDIMENTATION CONTROL

A. Site erosion and sediment control shall be paid for at the Contract lump sum amount for the item "Erosion and Sediment Control, Complete", which price shall include full compensation for all labor, equipment, materials, planning, developing, revising and documenting, monitoring activities to maintain effective functioning, furnishing, stockpiling, protecting, restocking, and removing materials, preparing site for a period of extended non-activity, inspecting, maintaining, and removing erosion control devices, restoring, mulching, tacking, and seeding all disturbed ground, work, and storage areas not otherwise covered, and all other construction site erosion and sedimentation control measures in accordance with current requirements and regulations of the City of St. Helens, Columbia County, the Department of Environmental Quality, and any other government agencies with jurisdiction over the project.

B. The measurement for payment for Erosion and Sediment Control will be made as a percentage complete of the Contract per construction phase, as follows:
   1. 25% of the amount of the erosion and sediment control when the developed ESC plan and schedule are complete and accepted, and the initial erosion control devices are installed
   2. 25% when 50 percent of the Contract is complete
   3. 25% when 75 percent of the Contract is complete
   4. 25% at completion of the work covered by this section

1.09 MEASUREMENT OF QUANTITIES

A. Owner's Representative and Owner will take measurements and compute quantities in Bid Tabulations. Contractor to verify quantities and units of measure prior to start of work.

B. Assist by providing necessary equipment, workers, and survey personnel as required.

C. Measurement Devices:
   1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
   2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
   3. Metering Devices: Inspected, tested and certified by the applicable state department within the past year.

D. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

E. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

F. Measurement by Area: Measured by square dimension using mean length and width or radius.

G. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

H. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

I. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Owner's Representative prior to starting work.

J. Contractor's Engineer Responsibilities: Sign surveyor's field notes or keep duplicate field notes , calculate and certify quantities for payment purposes.

1.10 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Owner, multiplied by the unit price.

B. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

1.11 DEFECT ASSESSMENT

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

B. Correction or Removal of Defective, Unacceptable or Unauthorized Work
   1. When work fails to meet Contract requirements and is inadequate to serve the design purpose it will be considered defective. The Contractor shall correct or remove and replace the work at the Contractor’s expense, as directed. All work which has been rejected or condemned shall be repaired, or if it cannot be repaired satisfactorily, it shall be removed and replaced at the Contractor’s expense.
   2. Defective materials shall be immediately removed from the site of the work. Work done without line and grade having been given, work done beyond the lines or not in conformity with the grades shown on the plans or as given, save as herein provided, work done without written authority and prior agreement in writing as to process, shall be done at the Contractor’s risk and shall be considered unauthorized and at the option of the Owner may not be measured and paid for and may be ordered removed at the Contractor’s expense.

3. Upon failure of the Contractor to repair satisfactorily or to remove and replace, if so directed, rejected, unauthorized or condemned work or materials immediately after receiving notice from the City, the Construction Manager shall, after giving written notice to the Contractor, have the authority to cause defective work to be remedied or removed and replaced, or to cause unauthorized work to be removed and to deduct the cost thereof from any monies due or to become due the Contractor.
4. Alternatively, the City may, at its option, declare the Contractor in default, in which event the performance bond surety shall complete the Contract.

C. Acceptance of Defective or Unauthorized Work.
1. When work fails to meet Contract requirements, but is adequate to serve the design purpose, the Owner and Owner's Representative will decide the extent to which the work will be accepted and remain in place. The Construction Manager will document the basis of acceptance by a letter and may adjust the Contract price.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 22 00

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Precedures for clarification and modification of the work.

B. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Section 01 21 00 - Allowances, for cash allowances affecting this section.

B. Section 01 22 00 - Unit Prices, for additional unit price requirements.

C. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.

D. Section 01 60 00 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

E. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Restrictions on emissions of indoor substitute products.

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
      a. Unavailability.
      b. Regulatory changes.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

1.04 REFERENCE STANDARDS

A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage) Current Edition.

B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase) Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CLARIFICATION AND MODIFICATION OF WORK

A. Contract Modifications:
   1. The Contractor expressly agrees that it shall not consider any order, instruction, clarification, response to a Request for Information or any other communication either written or oral given intentionally or unintentionally by any other person to do work that would cause a change in Contract Time or Price unless it is in the form of a Change Order from the City.

B. Interpretation and Minor Changes:
   1. The City has the authority to order minor changes in the Work including interpretations which are consistent with the intent of the Contract Documents, excluding:
      a. a change in Contract Price, or
      b. a change in the Contract Time, or
      c. a change in the means, methods, techniques, or sequence of work
   2. If the Contractor considers that a minor change so ordered causes a Change in Contract Price or Contract Time, the Contractor shall notify the City in writing within 15 days of receipt of the order and shall not proceed with the work except in the case of an

emergency endangering persons or property. If, after reviewing the Contractor's objection to a minor change, the City determines the work is required by the Contract Documents and does not involve a change in Price or Time, the City may direct the Contractor, in writing, to proceed with the work. If so directed, the Contractor may (1) accept the City's determination and proceed with the work or (2) give the City written notice 5 days in advance of beginning work stating that it intends to make a claim.

C. See 01 30 00 - Administrative Requirements for Request for Information (RFI) requirements.

D. Requests for Quotation:
   1. If a change involving Contract Price and/or Time or a new bid item is being considered, the Owner's Representative will issue a Request for Quotation describing the proposed change. The Contractor shall submit a quotation promptly so not to delay or interfere with the progress of the Work.

E. Change Requests:
   1. The Owner's Representative may, at the Contractor's request, authorize in writing changes in the Project Plans or specifications to facilitate or expedite the work of the Contractor, provided such changes are not detrimental to the work or to the best interests of the City. Requests for such changes shall be submitted in writing to the Owner's Representative. Such changes, as are authorized under this provision, shall be made without additional cost to the City, and the City reserves the right to receive an equitable adjustment in the Contract Price or Contract Time as a consideration for authorizing any such change. The Contractor shall maintain sole responsibility for assuring these changes meet all the requirements of the Contract.

F. Change Directives:
   1. When a change of work involves an addition, deletion, or adjustment of work or Contract Time which can be covered by Contract bid items and the estimated increase or decrease in Contract cost does not exceed $5,000, a Change Directive will be issued. A change directive may be issued in the field by the Construction Manager and the Contractor shall then proceed with the work without delay. Verbal change directives will be confirmed by written change directives and signed by the Contractor and the Owner's Representative thereby adding, deleting, modifying work, increasing, or decreasing Contract bid items.

G. Change Orders
   1. If the City and the Contractor agree on a change in Contract Price and/or Time for a proposed change, a Change Order will be issued and signed by the Owner's Representative and Contractor. An executed Change Order shall be conclusive and final settlement of the change in Contract Time and Price for the work covered by the Change Order including the effect of the change on all other portions of the work completed or not and shall include compensation for all related claims for disruption, impact, delay or extended overhead, if any, that may result from the change. Implied in every Change Order, unless expressly reserved by the City or Contractor, is a waiver of all known and unknown claims arising out of the Change Order. The City reserves the right to have changed work performed by a separate contractor or its own workers.

H. Changed or Unforseen Conditions
   1. During the progress of the work, if the Contractor should encounter conditions materially different from those shown on the Project Plans or indicated in the Project Specifications, or unknown conditions of a nature differing materially from those ordinarily encountered and generally recognized as being inherent in work of the character being performed, the Contractor shall, before proceeding further with work affecting or affected by such conditions, immediately notify the City which will promptly make an investigation. If the City determines conditions do materially differ and the Contractor could not reasonably have been expected to ascertain in advance the true nature of the existing conditions, a Change Order will be issued to provide for any increase or decrease in cost and difference in Contract Time resulting from any such condition.

I. Extra Work

1. The Owner shall have the right to require, and the Contractor agrees to do, extra work over and above that which is indicated by the Contract Documents and covered by the unit prices of the Contract or negotiated price or prices, which logically forms a part of the Contract, arising from reasonably unforeseeable conditions, changed requirements or new information. Such additional work shall be undertaken only upon written instructions from the Owner's Representative.
2. Extra Work performed on a Force Account Basis shall be used to equitably and uniformly compensate the Contractor for Extra Work when a negotiated price cannot be reached. Extra Work is defined as work that is significantly different from the Work included in the original or modified Contract, yet necessary for completing the Project. The Contractor shall maintain records in such a manner as to provide a clear distinction between direct cost of extra work paid for on force account basis and cost of other operations performed in connection with the Contract Documents.
3. Force Account procedures shall only be used as a last resort when an agreement cannot be reached on the price of a new Work item or when the extent of the Work is unknown or of such character that a price cannot be determined to a reasonable degree of accuracy. When the City orders Extra Work to be performed via Force Account, the Owner's Representative will discuss the proposed work with the Contractor and will seek the Contractor's comments and advice concerning the formulation of Force Account Work specifications. The Owner's Representative is not bound by the Contractor's comments and advice, and has final authority to: determine and direct the materials, equipment and labor to be used on the approved Force Account Work; and determine the time of the Contractor's performance of the ordered Force Account Work.
4. Before Extra Work to be performed on a Force Account Basis is authorized, the Construction Manager will make the determination that Extra Work is necessary. Only work not included in the Contract as awarded or in executed Change Orders but deemed by the Construction Manager to be necessary to complete the Project will be paid as Extra Work.
5. The following steps shall be followed to perform Extra Work:
   a. The Construction Manager will discuss the Extra Work with the Contractor, define the scope of work, and discuss the options, means and methods for completing the Extra Work.
   b. The Construction Manager shall attempt to negotiate a Contract Change Order with the Contractor to perform the Extra Work if the unable to successfully negotiate a Change Order, the Extra Work will be completed on a Force Account Basis.
   c. Extra Work shall not proceed on a Force Account Basis without a written and approved Extra Work Order prepared by the Construction Manager, which shall be signed by the Contractor and the Owner. The Extra Work order will determine when, how, and with what Equipment and labor the Extra Work will be completed.
6. For each day Extra Work is performed, the City's Project Inspector shall complete a Daily Force Account Record which shall be signed by both the Inspector and the Contractor's authorized representative at the end of the day. These signatures indicate agreement on the accuracy and completeness of the information recorded on the Daily Force Account Record.
7. The Daily Force Account Record will be the basis for payment. Contractor shall not proceed with Extra Work without daily agreement on the Daily Force Account Record.

3.02 SUBSTITUTIONS GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
   4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.

5. Waives claims for additional costs or time extension that may subsequently become apparent.
6. Agrees to reimburse Owner and Owner's Representative for review or redesign services associated with re-approval by authorities.

B. A Substitution Request for specified installer constitutes a representation that the submitter:
1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
1. Note explicitly any non-compliant characteristics.

D. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
1. No specific form is required. Contractor's Substitution Request documentation must include the following:
a. Project Information:
1) Official project name and number, and any additional required identifiers established in Contract Documents.
2) Owner's, Owner's Representative's, and Contractor's names.
b. Substitution Request Information:
1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
2) Indication of whether the substitution is for cause or convenience.
3) Issue date.
4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
5) Description of Substitution.
6) Reason why the specified item cannot be provided.
7) Differences between proposed substitution and specified item.
8) Description of how proposed substitution affects other parts of work.
9) Buy American Certification, where required..
c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
1) Physical characteristics.
2) In-service performance.
3) Expected durability.
4) Visual effect.
5) Warranties.
6) Other salient features and requirements.
d. Impact of Substitution:
1) Savings to Owner for accepting substitution.
2) Change to Contract Time due to accepting substitution.

E. Limit each request to a single proposed substitution item.
1. Submit an electronic document, combining the request form with supporting data into single document.

3.03 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:
1. Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

3.04 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Submittal Form (after award of contract):
1. Submit substitution requests by completing the pre-approved form. See Section 01 30 00 for additional submittal information and instructions. Use only this form; other forms of

submission are unacceptable.

B. Owner will consider requests for substitutions only within 15 days after date of Agreement.

C. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Owner, in order to stay on approved project schedule.

D. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Owner, in order to stay on approved project schedule.
   1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
   2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
   3. Bear the costs engendered by proposed substitution of:
      a. Owner's compensation to the Owner's Representative for any required redesign, time spent processing and evaluating the request.

E. Substitutions will not be considered under one or more of the following circumstances:
   1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
   2. Without a separate written request.

3.05 RESOLUTION

A. Owner may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Owner will notify Contractor in writing of decision to accept or reject request.
   1. Owner's decision following review of proposed substitution will be noted on the submitted form.

3.06 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

B. See Section 01 20 00 for price adjustments related to modifications.

3.07 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

END OF SECTION 01 25 00

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Electronic document submittal service.

C. Prebid meeting.

D. Preconstruction meeting.

E. Site mobilization meeting.

F. Progress meetings.

G. Construction progress schedule.

H. Contractor's daily reports.

I. Progress photographs.

J. Coordination drawings.

K. Submittals for review, information, and project closeout.

L. Number of copies of submittals.

M. Requests for Interpretation (RFI) procedures.

N. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 32 16 - Construction Progress Schedule: Form, content, and administration of schedules.

B. Section 01 60 00 - Product Requirements: General product requirements.

C. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.

D. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to Construction Manager:
   1. Requests for Interpretation (RFI).
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
   1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
   2. Contractor and Owner's Representative are required to use this service.
   3. It is Contractor's responsibility to submit documents in allowable format.
   4. Subcontractors, suppliers, and Owner's Representative's consultants are to be permitted to use the service at no extra charge.
   5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
   6. Paper document transmittals will not be reviewed.
   7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

B. Submittal Service:
   1. Email will be used to submit and respond to submittals, RFIs, and other documents noted in 3.01.A.1. The Construction Manager will utilize Smartsheet for file storage for the Owners Representative and inspection team to have access to project files when needed..

C. Project Closeout: Owner's Representative will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRE-BID CONFERENCE

A. A non-mandatory, but highly-encouraged Pre-Bid Conference will be held at 10:00 AM on August 9. 2023 in the City Hall Council Chambers at 265 Strand Street, St. Helens, OR. A site visit will follow immediately after the pre-bid conference. Safety vest required for site visit.

3.03 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Owner's Representative.
   3. Construction Manager
   4. Contractor.
   5. Design Discipline Leads: Landscape, Civil, Structural, Architect, Electrical, Signage.
   6. Appropriate subcontractors and utility representatives.

C. Purpose:
   1. The purpose of this meeting will be to review and discuss the proposed methods and practices for accomplishing the required work, job site procedures, roles and responsibilities, schedule, and other requirements of the Contract.

D. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.

4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Submission of initial Submittal schedule.
6. Designation of personnel representing the parties to Contract
7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
8. Scheduling.
9. Scheduling activities of a Geotechnical Engineer.

E. Construction Manager will record minutes and distribute copies to participants, with copies to Owner's Representative, Owner, Contractor participants, and those affected by decisions made.

F. Contractor shall submit a detailed construction schedule, list of emergency contacts, and list of subcontractors, and other required documentation listed on the Project Documentation Checklist of the Supplementary section of these Contract Documents either before or at the meeting for discussion.

3.04 OWNER / ARCHITECT / CONTRACTOR (OAC) MEETINGS

A. Construction Manager will schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

B. Attendance Required:
1. Contractor.
2. Construction Manager
3. Owner.
4. Owner's Representative.
5. Contractor's superintendent.
6. Major subcontractors.
7. Lead Inspector.

C. Agenda:
1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of RFIs log and status of responses.
7. Review of off-site fabrication and delivery schedules.
8. Maintenance of progress schedule.
9. Corrective measures to regain projected schedules.
10. Planned progress during succeeding work period.
11. Coordination of projected progress.
12. Maintenance of quality and work standards.
13. Effect of proposed changes on progress schedule and coordination.
14. Other business relating to work.

D. Construction Manager will record minutes and distribute copies within two days after meeting to participants, with copies to Owner's Representative, Owner, Contractor participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 01 32 16

3.06 EROSION AND SEDIMENTATION PREVENTION PLAN - SEE SECTION 01 57 13

3.07 HEALTH AND SAFETY PLAN

A. Contractor shall develop, publish, and implement an overall Health and Safety Plan for the Project. This Plan shall conform to all applicable codes. The Plan shall be assembled to address project specific health and safety issues to both the public and on-site personnel. The plan shall include the following items when they apply:

1. Employee orientation
2. Safety inspections
3. Instruction and training
4. Accident reporting
5. Signs and barricades
6. Fire prevention and protection
7. Welding, cutting and burning
8. Painting and surface treatment
9. Electricity
10. Machinery and mechanized equipment
11. Excavations
12. Sanitation
13. Hazardous communications program
14. Chlorine Safety
15. Hazardous Materials
16. Job hazard analysis
17. First aid/medical facilities
18. Personal protective equipment
19. Confined space entry plan
20. Shoring plan
21. Fall protection plan
22. Emergency Action Plan
23. Installing and maintaining all necessary signs, lights, flares, barricades, railings, runways, stairs, bridges, and facilities
24. Pedestrian safety.

B. Observing any and all safety instructions received from the Owner, and following all laws and regulations concerning worker and public safety. In the event that the law requires greater safety obligations than that imposed by the Owner, the Contractor shall comply with the law.

C. If the project requires other health and safety issues to be addressed, they too shall be included in the Project Health and Safety Plan. The Plan shall subsequently be distributed to and implemented by the Contractor's personnel as well as its Subcontractors and Suppliers. Contractor shall fully implement and comply with the Safety Program.

D. Contractor shall notify the Owner when safety meetings will be held so that City's personnel may attend. A copy of the approved Health and Safety Plan must be maintained on-site at all times during the life of the Project. The Contractor shall provide signs on work zone fencing that provide information regarding access to businesses whose access is compromised by the project, and stating that such businesses are open and in operation, as applicable. The Contractor shall furnish and install the signs and provide sign attachments for the affected business names. Contractor's construction vehicles shall not exceed twenty (20) mph on City streets and will have flashers on at all times. If construction vehicles are used to transport equipment and/or material all equipment and material must be properly secured.

E. There will be no separate payment made for safety related expenses, and the costs thereof shall be considered incidental to construction.

3.08 DAILY CONSTRUCTION REPORTS

A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.

B. Transmit electronic copies to Owner and Construction Manager at weekly intervals.
   1. Submit in format acceptable to Owner.

C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
   1. Date.
   2. High and low temperatures, and general weather conditions.

3. List of subcontractors at Project site.
4. List of separate contractors at Project site.
5. Approximate count of personnel at Project site.
   a. Include a breakdown for supervisors, laborers, journeymen, equipment operators, and helpers.
6. Major equipment at Project site.
7. Material deliveries.
8. Safety, environmental, or industrial relations incidents.
9. Meetings and significant decisions.
10. Unusual events (submit a separate special report).
11. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
12. Change Orders received and implemented.
13. Testing and/or inspections performed.
14. List of verbal instruction given by Owner, Construction Manager and/or Owner's Representative.
15. Signature of Contractor's authorized representative.

3.09 PROGRESS PHOTOGRAPHS

A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.

B. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.

C. Photography Type: Digital; electronic files.

D. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable toOwner .

E. In addition to periodic, recurring views, take photographs of each of the following events:
   1. Completion of site clearing.
   2. Excavations in progress.
   3. Foundations in progress and upon completion.
   4. Retaining walls in progress and upond completion.
   5. Structural framing in progress and upon completion.
   6. Final completion, minimum of ten (10) photos.

F. Take photographs as evidence of existing project conditions.

G. Views:
   1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
   2. Consult with Owner for instructions on views required.
   3. Provide factual presentation.
   4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

H. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: Via email.
   2. File Naming: Include project identification, date and time of view, and view identification.
   3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
   4. Hard Copy: Printed hardcopy (grayscale) of PDF file.

3.10 REQUESTS FOR INFORMATION (RFI)

A. Definition: A request seeking one of the following:

1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.

C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
   a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
   b. Do not forward requests which solely require internal coordination between subcontractors.
2. Prepare in a format and with content acceptable to Owner.
   a. Submit a sample RFI form for approval by Owner prior to issuance of first RFI.
3. Prepare using software provided by the Electronic Document Submittal Service.
4. Combine RFI and its attachments into a single electronic file. PDF format is preferred.

D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
   a. Approval of submittals (use procedures specified elsewhere in this section).
   b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
   c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
   d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
   a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Owner's Representative, and any of its consultants, due to processing of such RFIs.

E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
1. Official Project name and number, and any additional required identifiers established in Contract Documents.
2. Owner's, Owner's Representative's, Construction Manager's and Contractor's names.
3. Discrete and consecutive RFI number, and descriptive subject/title.
4. Issue date, and requested reply date.
5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example;

routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
   1. Indicate current status of every RFI. Update log promptly and on a regular basis.
   2. Note dates of when each request is made, and when a response is received.
   3. Highlight items requiring priority or expedited response.
   4. Highlight items for which a timely response has not been received to date.
   5. Identify and include improper or frivolous RFIs.

H. Review Time: Construction Manager will respond and return RFIs to Contractor within 10 business days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
   1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
   2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
   3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
   4. Notify Construction Manager within 10 business days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.11 SUBMITTAL SCHEDULE

A. Submit to Construction Manager for review a schedule for submittals in tabular format.
   1. Submit at the same time as the preliminary schedule specified in Section - 01 32 16 - Construction Progress Schedule.
   2. Coordinate with Contractor's construction schedule and schedule of values.
   3. Format schedule to allow tracking of status of submittals throughout duration of construction.
   4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
   5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
      a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.12 SUBMITTALS FOR PROJECT STARTUP

A. Submit the following:
   1. Contractor and Subcontractor 24 Hour/7 Day Emergency Contract List
   2. Preconstruction documentation of sites, submit 14 days after NTP
   3. Health & Safety Plan
   4. Utility Rupture Response Plan, as required
   5. Location of dump site for excavated and removed material

6. Copies of all licenses and permits
7. Certified payroll

3.13 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Design data.
   3. Shop drawings.
   4. Schedules.
   5. Drawings.
   6. Samples for selection.
   7. Samples for verification.
   8. Material Safety Data Sheets

B. Submit to Construction Manager for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:
   1. Dimensions
   2. Identification of products and materials included
   3. Compliance with specified standards
   4. Notation of coordination requirements
   5. •Notation of dimensions established by field measurement.

E. Product Data includes manufacturer’s product literature and application, installation requirements, recommended repair requirements, technical data sheet on each product to be used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.

F. Review Time: Construction Manager will respond and return submittals to Contractor within 10 business days of receipt.
   1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

G. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.14 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Certificates.
   2. Test reports.
   3. Inspection reports.
   4. Manufacturer's instructions.
   5. Manufacturer's field reports.
   6. Other types indicated.

B. Submit for Owner's Representative's knowledge as contract administrator or for Owner.

3.15 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.

4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.16 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Owner's Representative.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.17 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Use a single transmittal for related items.
   2. Transmit using approved form.
   3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
   4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
   5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
      a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
   6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
      a. Send submittals in electronic format via email to Construction Manager.
   7. Schedule submittals to expedite the Project, and coordinate submission of related items.
      a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
      b. For sequential reviews involving Owner's Representative's consultants, Owner, or another affected party, allow an additional 7 days.
      c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Owner's Representative's approval, allow an additional 30 days.
   8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
   9. Provide space for Contractor and Owner's Representative review stamps.
   10. When revised for resubmission, identify all changes made since previous submission.
   11. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
   12. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
   13. Submittals not requested will not be recognized or processed.

B. Product Data Procedures:
   1. Submit only information required by individual specification sections.
   2. Collect required information into a single submittal.
   3. Submit concurrently with related shop drawing submittal.
   4. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
   2. Do not reproduce Contract Documents to create shop drawings.

3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:
   1. Transmit related items together as single package.
   2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
   3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

3.18 SUBMITTAL REVIEW

A. Submittals for Review: Owner's Representative will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Owner's Representative will acknowledge receipt and review. See below for actions to be taken.

C. Owner's Representative's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
   1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.

D. Owner's Representative's and consultants' actions on items submitted for review:
   1. Authorizing purchasing, fabrication, delivery, and installation:
      a. "No Exceptions Taken", or language with same legal meaning.
      b. "Reviewed with Comments", or language with same legal meaning.
         1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
      c. "No Exceptions Taken, Resubmit for Record", or language with same legal meaning
         1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
         2) Non-responsive resubmittals may be rejected.
   2. Not Authorizing fabrication, delivery, and installation:
      a. "Revise and Resubmit".
         1) Resubmit revised item, with review notations acknowledged and incorporated.
         2) Non-responsive resubmittals may be rejected.
      b. "Not Approved".
         1) Submit item complying with requirements of Contract Documents.

E. Owner's Representative's and consultants' actions on items submitted for information:
   1. Items for which no action was taken:
      a. "Received" - to notify the Contractor that the submittal has been received for record only.
   2. Items for which action was taken:
      a. "Reviewed" - no further action is required from Contractor.

F. The Owner's Representative's review of submittals shall not extend to means, methods techniques, sequences or procedures of construction, or to verify quantities, dimensions, weights or gages, or to fabrication processes, except when specifically indicated or required by the contract documents and will not relieve the Contractor from responsibility for errors of any sort in the submittals.

G. When submittals are required to be revised or corrected and resubmitted, the Contractor shall make much revisions and/or corrections and resubmit those items or other materials in the same manner as specified above. Submitted data shall be sufficient in detail for determination of compliance with the Contract Documents. No equipment or material for which listings, drawings, or descriptive material is required shall be installed until the Contractor has received approval from the Owner's Representative. Regardless of corrections made in or review given to the drawings by the Owner's Representative, the Contractor shall be responsible for the accuracy of such drawings and for their conformity to the drawings and specifications.

END OF SECTION 01 30 00

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.02 RELATED SECTIONS

1.03 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual 2004.

B. M-H (CPM) - CPM in Construction Management - Project Management with CPM 2015.

1.04 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

F. Submit in PDF format.

G. Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Construction Manager .

H. Submit under transmittal letter form specified in Section 01 30 00 - Administrative Requirements.

1.05 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.06 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Sheet Size: Multiples of 8-1/2 x 11 inches.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Provide sub-schedules to define critical portions of the entire schedule.

D. Include conferences and meetings in schedule.

E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

F. Indicate delivery dates for owner-furnished products.

G. Provide legend for symbols and abbreviations used.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

3.04 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Construction Manager and Owner at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.05 UPDATING SCHEDULE

A. Reivse project schedule whenever schedule deviates from previous approved schedule by 10%.

B. Maintain schedules to record actual start and finish dates of completed activities.

C. Indicate progress of each activity to date of revision, with projected completion date of each activity.

D. Annotate diagrams to graphically depict current status of Work.

E. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

F. Indicate changes required to maintain Date of Substantial Completion.

G. Submit reports required to support recommended changes.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers,Construction Manager, Owner's Representative, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION 01 32 16

SECTION 01 35 53
SECURITY PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security measures including entry control, personnel identification, and miscellaneous restrictions.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: use of premises and occupancy.

1.03 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into Project site and existing facilities.

B. Allow entrance only to authorized persons with proper identification.

C. Maintain log of workers and visitors, make available to Owner on request.

D. Contractor shall control entrance of persons and vehicles related to Owner's operations.

1.04 PERSONNEL IDENTIFICATION

A. Provide identification badge to each person authorized to enter premises.

B. Badge To Include: Personal photograph, name, assigned number , expiration date and employer.

C. Require return of badges at expiration of their employment on the Work.

1.05 RESTRICTIONS

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 35 53

SECTION 01 35 70
BUY AMERICA CERTIFICATION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Buy America Certification Requirements and Procedures.

1.02 RELATED REQUIREMENTS

A. Sections 70901-52 of the Infrastructure Investment and Jobs Act (Public Law 117-58), known as the Build America, Buy America Act

B. Memorandum M-22-11 for Heads of Executive Departments and Agencies, issued by the Executive Office of the President, Dated April 18, 2022.

C. General Applicability Waiver for De Minimus Purchases, issued by the Department of the Interior, dated February 21, 2023.

1.03 BACKGROUND INFORMATION

A. The St. Helens Riverwalk project is partially funded by a federal grant, which requires the portions of the project receiving those funds to comply with the Build America, Buy America Act, which mandates the use of iron, steel, manufactured products, and construction materials produced in the United States.

B. Items in the project have been sorted into two bid schedules: Bid Schedule A and Bid Schedule B. Federal grant money will be used toward items on Bid Schedule A only. As such, the items on Bid Schedule A are subject to Buy America requirements.

1.04 SUBMITTALS

A. Certification: Certificates or certified test results submitted by the Contractor which demonstrate proof of compliance with the Specifications for products, Materials, equipment, systems, and qualifications of personnel, manufacturers, fabricators, and installers including Certificate of Materials Origin for materials subject to Build America, Buy America requirements.

B. “Build America, Buy America” Certificates:
   1. “Build America, Buy America” certificates are required as part of each product submittal. Certificates shall be complete and accurate. Certificates shall indicate either compliance or non-compliance with the “Build America, Buy America” regulations. Certificates of non-compliance shall also include copies of any granted waivers or exemptions.
   2. Contractor shall submit a Certificate of Compliance template for approval by the Owner prior to submission of the first certificate for approval. Certification form shall include:
      a. Date
      b. Contractor name
      c. Item name and relevant spec section and/or drawing number
      d. Compliance/Non-compliance with description
      e. List of attachments

1.05 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 for manufactured goods.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 01 35 70

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. References and standards.

D. Testing and inspection agencies and services.

E. Contractor's construction-related professional design services.

F. Contractor's design-related professional design services.

G. Control of installation.

H. Mock-ups.

I. Tolerances.

J. Manufacturers' field services.

K. Defect Assessment.

1.02 RELATED REQUIREMENTS

A. Section 01 21 00 - Allowances: Allowance for payment of testing services.

B. Section 01 30 00 - Administrative Requirements: Submittal procedures.

C. Section 01 42 16 - Definitions.

D. Section 01 42 19 - Reference Standards.

E. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants 2008 (Reapproved 2023).

B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation 2017.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry 2022a.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2019.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2021.

G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components 2016.

H. IAS AC89 - Accreditation Criteria for Testing Laboratories 2021.

1.04 DEFINITIONS

A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.

B. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.

1. Design Services Types Required:

a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor’s sole responsibilities for construction means, methods, techniques, sequences, and procedures.

b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.

C. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.05 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
1. Temporary sheeting, shoring, or supports.
2. Temporary scaffolding.
3. Temporary bracing.
4. Temporary falsework for support of spanning or arched structures.
5. Temporary foundation underpinning.
6. Temporary stairs or steps required for construction access only.
7. Temporary hoist(s) and rigging.
8. Investigation of soil conditions to support construction equipment.

1.06 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.
1. Submit a Request for Interpretation to Owner's Representative if the criteria indicated are not sufficient to perform required design services.

C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
1. Design of Aluminum Composite Panel Roof Canopy System for the Pavilion, shown on Architecture Drawings..
2. Design of Micropiles adjacent to existing Tide Station, shown on Structural Drawings.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Designer's Qualification Statement: Submit for Owner's Representative's knowledge as contract administrator, or for Owner's information.
1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
   a. Full name.
   b. Professional licensure information.
   c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.

C. Design Data: Submit for Owner's Representative's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
2. Include required product data and shop drawings.
3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.

D. Test Reports: After each test/inspection, promptly submit two copies of report to Owner's Representative and to Contractor.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Compliance with Contract Documents.
      k. When requested by Owner's Representative, provide interpretation of results.
   2. Test report submittals are for Owner's Representative's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Owner's Representative, in quantities specified for Product Data.
   1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
   2. Certificates may be recent or previous test results on material or product, but must be acceptable to Owner's Representative.

F. Manufacturer's Field Reports: Submit reports for Owner's Representative's benefit as contract administrator or for Owner.
   1. Submit report in duplicate within 30 days of observation to Owner's Representative for information.
   2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

G. Erection Drawings: Submit drawings for Owner's Representative's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications:
   1. Prior to start of work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in Oregon.

C. Contractor's Quality Control (CQC) Plan:
   1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
      a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.

1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.

b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
   1) Management and control of documents and records relating to quality.
   2) Communications.
   3) Coordination procedures.
   4) Resource management.
   5) Process control.
   6) Inspection and testing procedures and scheduling.
   7) Control of noncomplying work.
   8) Tracking deficiencies from identification, through acceptable corrective action, and verification.
   9) Control of testing and measuring equipment.
   10) Project materials certification.
   11) Managerial continuity and flexibility.

c. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.

d. Acceptance of the plan is required prior to start of construction activities not including mobilization work. Owner's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. Owner reserves the right to require Contractor to make changes to the plan and operations, including removal of personnel, as necessary, to obtain specified quality of work results.

D. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

1.09 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Owner's Representative before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Owner's Representative shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.10 TESTING AND INSPECTION AGENCIES AND SERVICES

A. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:
   1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
   2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
   3. Laboratory: Authorized to operate in Oregon.

4. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 WORKMANSHIP

A. The work shall be performed in accordance with the best modern practice with materials and workmanship of the highest quality and suitable for their purpose. The Owner's Representative shall judge and determine the Contractor's compliance with these requirements. The Contractor shall ensure all work is of good quality, free from faults, defects, inferior materials, or equipment, will be performed by experienced knowledgeable personnel, and be in conformance with the Contract Documents. All work not conforming to these requirements, including substitutions not properly approved or authorized, shall be considered defective unless specifically accepted by the Owner.

3.02 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Owner's Representative before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.03 QUALITY OF MATERIALS

A. The Contractor shall incorporate into the Work only materials conforming to the specifications and approved by the Owner's Representative. The Contractor shall incorporate into the Work only manufactured products made of new materials unless otherwise specified in the Contract. The Owner may require additional testing or retesting to determine whether the materials or manufactured products meet specifications. Materials or manufactured products not meeting the specifications at the time they are to be used are unacceptable and must be removed immediately from the Project Site, unless otherwise directed by the Owner's Representative.

3.04 "OR EQUAL" CLAUSE

A. To establish a basis of quality, certain processes, types of machinery and equipment or kinds of material may be specified on the drawings or herein by designating a manufacturer's name and referring to its brand or product designation. It is not the intent of these specifications to exclude other processes, equipment or materials of a type and quality equal to those designated. When a manufacturer's name, brand or item designation is given, it shall be understood that the words "or equal" follow such name or designation, whether in fact they do so or not.

B. If the Contractor desires to furnish items by manufacturers other than those specified, he shall secure the approval of the Owner's Representative prior to placing a purchase order. No extras will be allowed the Contractor for any changes required to adopt the substitute equipment, materials, or processes. Therefore, the Contractor's proposal for an alternate shall include all costs for any modifications to the drawings, such as additional piping or changes in piping, or other modifications which may be necessary or required for approval and adoption of the proposed alternate equipment.

C. Section 01 35 70 - Buy America Certification Procedures applies to many items within the project. Substitutions must conform to requirements of that section.

3.05 MATERIALS AND EQUIPMENT

A. The Contractor warrants to the Owner that all materials and equipment furnished under this Contract shall be new unless otherwise specified in the Contract and that same shall be of good quality and workmanship, free from faults and defects and in conformance with the Contract documents. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Owner. No material shall be delivered to the work without prior approval of the Owner. All materials and equipment not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective and shall be promptly repaired or replaced by the Contractor at the Contractor's sole cost upon demand of the Owner. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.06 MOCK-UPS

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

B. Accepted mock-ups establish the standard of quality the Owner's Representative will use to judge the Work.

C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.

D. Notify Construction Manager and Owner's Representative fifteen (15) working days in advance of dates and times when mock-ups will be constructed.

E. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

F. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.

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

H. Obtain Owner's Representative's approval of mock-ups before starting work, fabrication, or construction.
   1. Owner's Representative will issue written comments within five (5) working days of initial review and each subsequent follow up review of each mock-up.
   2. Make corrections as necessary until Owner's Representative approval is issued.

I. Owner's Representative will use accepted mock-ups as a comparison standard for the remaining Work.

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

3.07 TOLERANCES

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

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

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

3.08 TESTING AND INSPECTION

A. It is the intent of the Owner to inspect all work on this project. The Contractor must pay for all testing needed to determine acceptability for any work done without inspection, as directed by the Construction Manager. The Contractor shall furnish the Owner with every reasonable facility for ascertaining whether the work performed was in accordance with the requirements and intent of the plans and specifications. Contractor shall provide safe access to all parts of the work and provide information and assistance to the to allow a complete and detailed inspection. Contractor shall give the Lead Inspector or the Construction Manager sufficient notice to inspect the work. Work performed without suitable inspection, as determined by the Construction Manager, may be ordered removed and replaced at Contractor's expense. The Contractor shall remove or uncover portions of finished work as directed, and once inspected, restore work to Contract requirements. The Owner will provide general construction inspection services of the project. The Owner will not provide any special inspections services for the project.

B. See individual specification sections for testing and inspection required.

C. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Owner's Representative and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Owner's Representative and Contractor of observed irregularities or non-compliance of Work or products.
   6. Perform additional tests and inspections required by Owner's Representative.
   7. Submit reports of all tests/inspections specified.

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

E. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Owner's Representative and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

F. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Owner's Representative.

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

3.09 MANUFACTURERS' FIELD SERVICES

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

B. Submit qualifications of observer to Owner's Representative 30 days in advance of required observations.
   1. Observer subject to approval of Owner's Representative.

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

3.10 DEFECT ASSESSMENT

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

B. If, in the opinion of Owner, it is not practical to remove and replace the work, Owner will direct an appropriate remedy or adjust payment.

C. All work which has been rejected or condemned shall be repaired. If it cannot be repaired satisfactorily, it shall be removed and replaced at the Contractor’s expense. Defective materials shall be immediately removed from the site of the work. Work done without line and grade having been given, work done beyond the lines or not in conformity with the grades shown on the plans or as given, save as herein provided, work done without written authority and prior agreement in writing as to process, shall be done at the Contractor’s risk and considered unauthorized and at the option of the Owner may not be measured and paid for and may be ordered removed at the Contractor’s expense.

D. Upon failure of the Contractor to repair satisfactorily or to remove and replace, if so directed, rejected, unauthorized or condemned work or materials immediately after receiving notice from the Owner, the Owner shall, after giving written notice to the Contractor, have the authority to cause defective work to be remedied or removed and replaced, or to cause unauthorized work to be removed and to deduct the cost thereof from any monies due or to become due the Contractor. Alternatively, the Owner may, at its option, declare the Contractor in default, in which event the performance bond surety shall complete the Contract.

END OF SECTION 01 40 00

SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY OF REFERENCE STANDARDS

A. Regulatory requirements applicable to this project are the following:

B. 28 CFR 35 - Nondiscrimination on the Basis of Disability in State and Local Government Services; Final Rule; Department of Justice current edition.

C. 28 CFR 36 - Nondiscrimination by Public Accommodations and in Commercial Facilities; Final Rule; Department of Justice current edition.

D. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.

E. 49 CFR 37 - Transportation Services for Individuals with Disabilities (ADA) current edition.

F. ADA Standards - 2010 ADA Standards for Accessible Design 2010.

G. FED-STD-795 - Uniform Federal Accessibility Standards (UFAS) 1988.

H. 29 CFR 1910 - Occupational Safety and Health Standards Current Edition.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

J. ICC (IFC) - International Fire Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. NFPA 1 - Fire Code 2021, with Errata (2022).

L. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

M. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. ICC (IPC) - International Plumbing Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

O. IAPMO (UPC) - Uniform Plumbing Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

P. IAPMO (UPC) - Uniform Plumbing Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Q. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

R. ICC (IECC) - International Energy Conservation Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

S. ICC (IPMC) - International Property Maintenance Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

T. Erosion and Sedimentation Control Regulations:.

1.02 CODE REQUIREMENTS

A. All work shall be done in strict compliance with the requirements and current revisions, as applicable, of:
   1. Uniform Plumbing Code
   2. Uniform Mechanical Code
   3. National Electric Code
   4. National Electric Safety Code
   5. City of St. Helens Engineering Standards Manual (Municipal Code Title 18)
   6. City of St. Helens Development Code
   7. State of Oregon Bureau of Labor and Industries (BOLI)
   8. Oregon Department of Environmental Quality (DEQ)

9. Manual of Uniform Traffic Control Devices (MUTCD)
10. American National Standards Institute (ANSI)
11. American Water Works Association (AWWA)

B. In case of disagreement between these codes or specifications, the more restrictive shall prevail.

1.03 PREVAILING WAGE RATES FOR PUBLIC WORKS CONTRACTS

A. Prevailing wage rates apply for public works construction projects costing over $50,000. If a project begins with a total project cost under $50,000, but change orders increase the project cost to more than $50,000, the entire project will be subject to the prevailing wage rate law, including all work already performed on the project. OAR 839-025-0100(1)(a).

B. For each labor classification, the Contractor shall abide by the requirements of the prevailing wage rates for the State of Oregon Bureau of Labor and Industries (BOLI), as required. Applicable Oregon prevailing wage rates are contained in the publication, Prevailing Wage Rates for Public Works Contracts in Oregon. Effective on the date the project was first advertised for Bid. ORS 279C.830(1)(a). The Contractor and every subcontractor must have a public works bond filed with the Construction Contractors Board before starting work on the project, unless exempt. ORS 279C.830(2); OAR 839-025-0020(4).

1.04 PERMITS, FEES, AND LICENSES

A. Unless provided for otherwise in these Contract Documents, all permits, licenses, and fees shall be obtained by the Contractor and all costs shall be borne by the Contractor. Contractor shall be responsible for compliance with all permit provisions and shall accommodate all special inspections required thereof, all at no additional expense to the City beyond prices as bid. Contractor and Subcontractors shall obtain required business licenses from the City of St. Helens. Contractor shall stay fully informed of all permits required by various jurisdictions having authority over the Work and shall also bear all costs of fines or claims arising from, or based on, the violation of permit requirements.

B. There will be no measurement of work performed under this section and all permit requirements will be considered incidental to the work and no separate payment will be made.

1.05 US MAIL SERVICE

A. Contractor shall comply and cooperate fully with the requirements of the local authority of the U.S. Postal Service to maintain mailboxes and uninterrupted mail service during construction.

1.06 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements.

1.07 QUALITY ASSURANCE

A. Contractor's Designer Qualifications: Refer to Section - 01 40 00 - Quality Requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 41 00

SECTION 01 42 16
DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section supplements the definitions contained in the General Conditions.

B. Other definitions are included in individual specification sections.

1.02 ABBREVIATIONS

A. AASHTO American Association of State Highway and Transportation Officials

B. ACI American Concrete Institute

C. ADA Americans with Disabilities Act

D. ANSI American National Standards Institute

E. ASTM American Society for Testing and Materials

F. AWWA American Water Works Association

G. BOLI Oregon Bureau of Labor & Industries

H. DEQ Department of Environmental Quality, State of Oregon

I. EPA U.S. Environmental Protection Agency

J. IBC International Building Code

K. MUTCD Manual on Uniform Traffic Control Devices

L. NACWA National Association of Clean Water Agencies

M. NASSCO National Association of Sewer service Companies

N. NEC National Electrical Code

O. NESC National Electrical Safety Code

P. OAR Oregon Administrative Rules

Q. ODOT Oregon Department of Transportation

R. OR-OSHA Oregon Occupational Safety & Health Administration

S. ORS Oregon Revised Statutes

T. UBC Uniform Building Code (as adopted by the State of Oregon)

U. UMC Uniform Mechanical Code

V. UPC Uniform Plumbing Code (as adopted by the State of Oregon)

1.03 DEFINITIONS

A. Furnish: To supply, deliver, unload, and inspect for damage.

B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

D. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

E. Provide: To furnish and install.

F. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 42 16

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Dewatering

B. Temporary utilities.

C. Temporary telecommunications services.

D. Temporary sanitary facilities.

E. Temporary Controls: Barriers, enclosures, and fencing.

F. Security requirements.

G. Vehicular access and parking.

H. Waste removal facilities and services.

I. Project identification sign.

1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).

1.03 DEWATERING

A. Provide temporary means and methods for dewatering all temporary facilities and controls.

B. Maintain temporary facilities as directed by Construction Manager.

1.04 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical power and metering, consisting of connection to existing facilities.
   2. Water supply, consisting of connection to existing facilities.

B. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

C. Existing facilities may not be used.

D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.05 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.

B. Telecommunications services shall include:
   1. Telephone Land Lines: One line, minimum; one handset per line.
   2. Internet Connections: Minimum of one; DSL modem or faster.

1.06 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

C. At end of construction, return facilities to same or better condition as originally found.

1.07 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.08 FENCING

A. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.09 SECURITY - SEE SECTION 01 35 53

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.10 ACCESS

A. The Contractor shall not unreasonably restrict access to public facilities commercial property, fire hydrants, residential property, and other areas where the public can be expected to be present, such as sidewalks and streets, without first obtaining approval of the Owner . Driveways shall be closed only with the approval of the Owner and after obtaining specific permission from the property owner. In addition, the Contractor shall not obstruct or interfere with travel over any public street or sidewalk without approval of the Owner.

B. The Contractor shall not interfere with the normal operation of any public transit vehicles unless otherwise authorized.

1.11 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Provide means of removing mud from vehicle wheels before entering streets.

E. Designated existing on-site roads may be used for construction traffic.

F. Provide temporary parking areas to accommodate construction personnel. Personal vehicles of the Contractor’s employees shall not be parked on the paved shoulders, public street parking, or in the traveled way, including any section closed to public traffic. Contractor will secure private parking at his own expense or use the free City parking lot behind 231 S 1st Street.

G. Existing parking areas may be used for construction parking with approval by the Owner.

H. The Contractor shall make any necessary contacts to arrange for the removal of parked automobiles, vehicles and other obstructions if they would interfere with the performance of the Contractor’s work.

1.12 WORK SITE

A. The Contractor shall adequately cover and barricade any open manholes, excavations, etc. to eliminate potential hazards to the public during construction. Employee vehicles of the Contractor and Subcontractor(s) shall be parked in accordance with local parking ordinances. The Contractor shall keep the project site safe in compliance with applicable law. Safety includes, but is not limited to:

1. Providing an approved type of secured and adequate barricades or fences that are easily visible from a reasonable distance around open excavations
2. Closing up or covering with steel plates all open excavations at the end of each Working Day in all street areas and other areas when it is reasonably required for public safety
3. Marking all open work and obstructions by lights at night
4. Installing and maintaining all necessary signs, lights, flares, barricades, railings, runways, stairs, bridges, and facilities.
5. Observing any and all safety instructions received from the Owner, and following all laws and regulations concerning worker and public safety. In the event that the law requires

greater safety obligations than that imposed by the Owner, the Contractor shall comply with the law.

1.13 TRAFFIC CONTROL AND PROTECTION

A. Where required, the Contractor will prepare plans and implement traffic control system which provides:
   1. Safe pedestrian and vehicle travel through the site,
   2. ADA accessibility around site.
   3. Safety for workers,
   4. 10’ wide minimum width for passenger vehicles,
   5. Adequate signage to protect pedestrians and vehicles from confusion

B. The Contractor shall conduct his operations to cause the minimum obstruction and inconvenience to traffic and to places of business, multiple dwelling units, and residences adjacent to the work. The Contractor shall not park construction vehicles contractor employee vehicles, stage materials or stockpiles in front of any business or residential driveway access and the Contractor shall maintain access to private parking lots within the block where work is in progress. Construction vehicles shall not be left running for any length of time if parked in front of a business or residential unit.

C. If required, lane or road closures shall be coordinated with the City a minimum of 10 business days in advance of the needed closure. Contractor shall provide notifications of closure as requested by the City, which include but are not limited to published notification in the newspaper, notification of residents and businesses, and notification of agencies.

D. A. Contractor shall submit a traffic control plan (TCP) for approval by the Owner prior to construction. The TCP shall be maintained in accordance the latest version of MUTCD.
   1. The TCP shall be submitted to the Owner for approval not later than ten (10) days after the issuance of the Notice to Proceed and prior to the start of any construction. Upon request, the Contractor will be provided with base maps of the project area for the traffic control plan.
   2. At a minimum, Traffic Control Plan shall:
      a. Show location and limits of the work zone
      b. Give dimensions of lanes affected by traffic control that will be open to traffic
      c. Indicate signing, cone placement, barricades, and other methods of delineation
      d. Dimension location of signs and cone tapers
      e. Identify side streets and driveways affected by construction and show how they will be handled
      f. Show how pedestrian and bicycle traffic will be accommodated through the construction site
      g. Demonstrate how two-way traffic will be maintained

E. The Contractor shall maintain traffic control and protection in the work areas twenty-four (24) hours per day. The Contractor shall conduct its operations to keep one lane of traffic open for public and private access at all times on City, County, State, and Federal streets, roads and highways. Permits obtained for the project may have more stringent requirements than noted in this section. The Contractor is to notify all emergency services of any lane closures or temporary traffic control measures. No road shall be closed without prior approval by the City Engineer.

F. Emergency vehicle, pedestrian and vehicle access shall be available to all homes in the project area. All streets shall be restored to allow normal traffic during non-working hours

G. No traffic lanes may be closed before 8:00 a.m. or after 4:00 p.m. without written City permission from the City Engineer, except as shown on the plans.

H. Detours shall be surfaced with gravel or crushed rock and maintained in good condition. Detours for pedestrians shall not exceed one block in length, and foot bridges over the trenches shall be provided with adequate handrails. Work shall be carried on with due regard for safety to the public.

I. Open trenches shall be provided with barricades of a type that can be seen at a reasonable distance, and at night they shall be distinctly indicated by adequately placed lights. Open trenches shall be backfilled or plated when the Contractor is not actively working.

J. The full width of the traveled way shall be open for use by public traffic on Saturday, Sundays and designated legal holiday(s), after 4:00 p.m. on Fridays and the day preceding designated legal holidays, and when construction operations are not actively in progress, unless work has specifically been authorized by the Owner.

K. The location of traffic control devices shall be checked by the Contractor especially at the beginning of the work period and periodically throughout the workday, to ensure that the devices are properly placed and maintained

L. The Contractor shall conduct all operations with the least possible obstruction and inconvenience to the public. The Contractor shall have under construction no greater length or amount of work than can be completed within a workday with due regards to the rights of the public

M. Work shall be accomplished in such a manner as to provide access to all intersecting streets and adjacent properties whenever possible. If access to any property cannot be provided, then adequate nearby parking shall be provided and maintained until direct access can again be restored. If during the course of the work, it is necessary to restrict access to certain driveways for an extended period of time, the Contractor shall notify the affected residents, in writing, at least forty-eight (48) hours in advance

N. The Contractor shall be responsible for providing adequate safeguards, safety devices, protective equipment, and any other needed actions to protect life, health, and safety of the public, and to protect property in connection with the performance of the work covered by the contract. The Contractor shall perform any measures or actions the City or the Owner's Representative may deem necessary to protect the public and property

1.14 NOISE CONTROL

A. Contractor shall employ noise-reducing construction practices to comply with local noise ordinances and shall identify feasible measures to that can be employed to reduce construction noise.

1.15 EMERGENCY

A. Emergency vehicles, including but not limited to police, fire, and disaster units shall be provided access to the work site at all times.

1.16 WASTE REMOVAL

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. The Contractor shall, on a continuing basis, keep the surfaces of all public and private roadways, sidewalks, and other pathways free of dirt, mud, cold plane grindings, and other materials that the Contractor may place upon the road. The cost of performing such work shall be included in the Contractor’s Bid and no additional payment will be made for performing this task.

C. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

D. Provide containers with lids. Remove trash from site periodically.

E. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

F. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.17 PROJECT IDENTIFICATION

A. Provide project identification sign of design, construction, and location approved by Owner.

B. No other signs are allowed without Owner permission except those required by law.

1.18 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture and drawing display table.

B. Space for Project meetings may be provided at City Hall offices. Coordinate use with the Owner.

C. Locate offices a minimum distance of 30 feet from existing structures.

1.19 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 50 00

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Performance bond.

E. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

A. City of St. Helens Special Provision 02210: Refer to City spec for erosion and sedimentation control requirements.

B. City of St. Helens Special Provision 02310: Refer to City spec for site clearingl requirements.

C. City of St. Helens Special Provision 02400: Refer to City spec for construction staging areas requirements.

D. Section 31 10 00 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.

E. Section 31 22 00 - Grading: Temporary and permanent grade changes for erosion control.

F. Section 32 11 23 - Aggregate Base Courses: Temporary and permanent roadways.

1.03 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus 2021.

B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity 2022.

C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles 2015 (Reapproved 2023).

D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles 2015a.

E. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile 2021a.

F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples 2017 (Reapproved 2021).

G. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit Current Edition.

1.04 PERFORMANCE REQUIREMENTS

A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP).

B. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.

C. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.

1. Owner will obtain permits and pay for securities required by authority having jurisdiction.

D. Provide to Owner a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.

E. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

F. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.

G. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.
   2. Prevent development of ruts due to equipment and vehicular traffic.
   3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

H. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
   1. Prevent windblown soil from leaving the project site.
   2. Prevent tracking of mud onto public roads outside site.
   3. Prevent mud and sediment from flowing onto sidewalks and pavements.
   4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

I. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
   2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.

J. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
   1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.

K. Open Water: Prevent standing water that could become stagnant.

L. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mulch: Use one of the following:
   1. Straw or hay.
   2. Erosion control matting or netting.

B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

C. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:

1. Average Opening Size: 30 U.S. Std. Sieve (0.600 mm), maximum, when tested in accordance with ASTM D4751.
2. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491/D4491M.
3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
4. Tensile Strength: 100 pounds-force (450 N), minimum, in cross-machine direction; 124 pounds-force (550 N), minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
6. Tear Strength: 55 pounds-force (245 N), minimum, when tested in accordance with ASTM D4533/D4533M.
7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

D. Silt Fence Posts: One of the following, minimum 5 feet (1500 mm) long:
1. Hardwood, 2 by 2 inches (50 by 50 mm) in cross section.

E. Gravel: See Section 32 11 23 for aggregate.

F. Inlet Protection: Per Plans.

G. Concrete Truck Washout: Per Plans.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

B. Construction Entrances: Traffic-bearing aggregate surface.
1. Width: As required; 20 feet (7 m), minimum.
2. Length: 50 feet (16 m), minimum.
3. Provide at each construction entrance from public right-of-way.
4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.

C. Linear Sediment Barriers: Made of silt fences.
1. Provide linear sediment barriers:
   a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
   b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
   c. Along the toe of cut slopes and fill slopes.
2. Space sediment barriers with the following maximum slope length upslope from barrier:
   a. Slope of Less Than 2 Percent: 100 feet (30 m)..
   b. Slope Between 2 and 5 Percent: 75 feet (23 m).
   c. Slope Between 5 and 10 Percent: 50 feet (15 m).
   d. Slope Between 10 and 20 Percent: 25 feet (7.5 m).
   e. Slope Over 20 Percent: 15 feet (4.5 m).

D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
2. Straw bale row blocking entire inlet face area; anchor into pavement.

E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.

F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.

G. Soil Stockpiles: Protect using one of the following measures:
   1. Cover with polyethylene film, secured by placing soil on outer edges.
   2. Cover with mulch at least 4 inches (100 mm) thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches (150 mm) of straw or hay.

H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.

I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

A. Traffic-Bearing Aggregate Surface:
   1. Excavate minimum of 6 inches (150 mm).
   2. Place geotextile fabric full width and length, with minimum 12 inch (300 mm) overlap at joints.
   3. Place and compact at least 6 inches (150 mm) of 1 1/2 to 3 1/2 inch (40 to 90 mm) diameter stone.

B. Silt Fences:
   1. Store and handle fabric in accordance with ASTM D4873/D4873M.
   2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch (405 mm) high barriers with minimum 36 inch (905 mm) long posts spaced at 6 feet (1830 mm) maximum, with fabric embedded at least 4 inches (100 mm) in ground.
   3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch (710 mm) high barriers, minimum 48 inch (1220 mm) long posts spaced at 6 feet (1830 mm) maximum, with fabric embedded at least 6 inches (150 mm) in ground.
   4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet (6 m), use nominal 32 inch (810 mm) high barriers with woven wire reinforcement and steel posts spaced at 4 feet (1220 mm) maximum, with fabric embedded at least 6 inches (150 mm) in ground.
   5. Install with top of fabric at nominal height and embedment as specified.
   6. Embed bottom of fabric in a trench on the upslope side of fence, with 2 inches (50 mm) of fabric laid flat on bottom of trench facing upslope; backfill trench and compact.
   7. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches (460 mm), with extra post.
   8. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches (300 mm) high with post spacing not more than 4 feet (1220 mm).

C. Mulching Over Large Areas:
   1. Dry Straw and Hay: Apply 2-1/2 tons per acre (6350 kg per hectare); anchor using dull disc harrow or emulsified asphalt applied using same spraying machine at 100 gallons of water per ton of mulch.
   2. Erosion Control Matting: Comply with manufacturer's instructions.

D. Mulching Over Small and Medium Areas:
   1. Dry Straw and Hay: Apply 4 to 6 inches (100 to 150 mm) depth.
   2. Erosion Control Matting: Comply with manufacturer's instructions.

E. Temporary Seeding:
   1. When hydraulic seeder is used, seedbed preparation is not required.
   2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
   3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft (0.5 kg per 100 sq m).
   4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft (6 to 8 kg per 100 sq m).
   5. Incorporate fertilizer into soil before seeding.
   6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.

7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches (13 mm) or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Silt Fences:
1. Promptly replace fabric that deteriorates unless need for fence has passed.
2. Remove silt deposits that exceed one-third of the height of the fence.
3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Clean out temporary sediment control structures weekly and relocate soil on site.

E. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION 01 57 13

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

F. Procedures for Owner-supplied products.

G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Lists of products to be removed from existing site.

B. Section 01 10 00 - Summary: Identification of Owner-supplied products.

C. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

D. Section 01 40 00 - Quality Requirements: Product quality monitoring.

E. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

F. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 REFERENCE STANDARDS

A. ASTM D6866 - Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis 2022.

B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
   1. See Section 01 10 00 for list of items required to be salvaged for reuse and relocation.
   2. If reuse of other existing materials or equipment is desired, submit substitution request.

2.02 NEW PRODUCTS

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

B. See Section 01 40 00 - Quality Requirements, for additional source quality control requirements.

C. Use of products having any of the following characteristics is not permitted:
   1. Made using or containing CFC's or HCFC's.
   2. Made of wood from newly cut old growth timber.
   3. Containing lead, cadmium, or asbestos.

D. Where other criteria are met, Contractor shall give preference to products that:
   1. If used on interior, have lower emissions, as defined in Section 01 61 16.
   2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 25 00 - Substitution Procedures.

3.02 OWNER-SUPPLIED PRODUCTS

A. See Section 01 10 00 - Summary for identification of Owner-supplied products.

B. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

C. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.

3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.
   1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.

C. Store and protect products in accordance with manufacturers' instructions.

D. Store with seals and labels intact and legible.

E. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.

F. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

G. For exterior storage of fabricated products, place on sloped supports above ground.

H. Provide off-site storage and protection when site does not permit on-site storage or protection.
   1. Execute a formal supplemental agreement between Owner and Contractor allowing off-site storage, for each occurrence.

I. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

J. Comply with manufacturer's warranty conditions, if any.

K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

L. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

M. Prevent contact with material that may cause corrosion, discoloration, or staining.

N. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

O. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 01 60 00

SECTION 01 61 16
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

C. Requirement for installer certification that they did not use any non-compliant products.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 40 00 - Quality Requirements: Procedures for testing and certifications.

C. Section 01 60 00 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

D. Section 07 92 00 - Joint Sealants: Emissions-compliant sealants.

1.03 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
   3. Products making up wall and ceiling assemblies.

B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings applied on site.
   2. Interior adhesives and sealants applied on site, including flooring adhesives.
   3. Wet-applied roofing and waterproofing.
   4. Other products when specifically stated in the specifications.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
   1. Concrete.
   2. Clay brick.
   3. Metals that are plated, anodized, or powder-coated.
   4. Glass.
   5. Ceramics.
   6. Solid wood flooring that is unfinished and untreated.

1.04 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. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings 2005 (Reapproved 2018).

C. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board 2020.

D. SCAQMD 1113 - Architectural Coatings 1977, with Amendment (2016).

E. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2017).

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

C. Installer Certifications Regarding Prohibited Content: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of installer's products, or 2) that such products used comply with these requirements.

1.06 QUALITY ASSURANCE

A. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
   1. Evidence of Compliance: Acceptable types of evidence are:
      a. Report of laboratory testing performed in accordance with requirements.

B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

B. VOC-Content-Restricted Products: VOC content not greater than required by the following:
   1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
   2. Joint Sealants: SCAQMD 1168 Rule.
   3. Paints and Coatings: Each color; most stringent of the following:
      a. 40 CFR 59, Subpart D.
      b. SCAQMD 1113 Rule.
      c. CARB (SCM).
   4. Wet-Applied Roofing and Waterproofing: Comply with requirements for paints and coatings.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION 01 61 16

SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Pre-installation meetings.

C. Cutting and patching.

D. Surveying for laying out the work.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures, final inspection procedures, submittal of warranties, As-builts, other regulatory inspections, removal of temporary facilities, final cleaning, and demobilization.

I. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

C. Section 01 40 00 - Quality Requirements: Testing and inspection procedures.

D. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.

E. Section 01 57 13 - Temporary Erosion and Sediment Control: Additional erosion and sedimentation control requirements.

F. Section 01 74 19 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.

G. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

H. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.

I. Section 07 84 00 - Firestopping.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2022, with Errata (2021).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
   1. On request, submit documentation verifying accuracy of survey work.
   2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
   3. Submit surveys and survey logs for the project record.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.

2. Identify demolition firm and submit qualifications.
3. Include a summary of safety procedures.

D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate Contractor.
6. Include in request:
a. Identification of Project.
b. Location and description of affected work.
c. Necessity for cutting or alteration.
d. Description of proposed work and products to be used.
e. Effect on work of Owner or separate Contractor.
f. Written permission of affected separate Contractor.
g. Date and time work will be executed.

E. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in Oregon and acceptable to Owner's Representative. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.06 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

D. Perform dewatering activities, as required, for the duration of the project.

E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
1. Minimize amount of bare soil exposed at one time.
2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
2. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

I. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.07 SITE SAFETY AND ACCIDENT PREVENTION

A. The Contractor shall be solely and completely responsible for conditions of the job site, including the safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. The required or implied duty of the Construction Manager to conduct construction review of the Contractor's performance does not and is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the job site.

B. The Contractor shall comply with the safety standards provisions of applicable laws and building and construction codes. The Contractor shall exercise every precaution at all times for the prevention of accidents and protection of persons, including employees, and property. During the execution of the work the Contractor shall provide and maintain all guards, railing, lights, warnings, and other protective devices which are required by law or which are reasonably necessary for the protection of persons and property from injury or damage. In the event an unsafe act is observed the Contractor will be asked by the Project Manager to cease all work.

C. It is the Contractor’s responsibility to follow and observe OR-OSHA guidelines and take all precautions necessary to complete the work. The Contractor shall maintain on site at all times a competent field supervisor in charge of the work. The field supervisor shall be approved in writing by the Owner prior to commencement of work. Any change of supervision must also be approved in writing by the Owner prior to the change. The field supervisor shall be responsible for the safety of all site workers and site conditions as well as ensuring that all work is conducted in conformance with these specifications and to the level of quality specified.

D. The Contractor’s designated competent field supervisor shall be in charge of accident prevention. Contractor shall take all actions necessary to prevent damage, injury and loss to persons and property as a result of accidents.

1.08 COORDINATION

A. See Section 01 10 00 for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Notify affected utility companies and comply with their requirements.

D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean-up of work of separate sections.

H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Construction Manager four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with electronic copies to Construction Manager, Owner's Representative, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION SURVEY WORK

A. Contractor shall make all supporting computations and field notes required for control of the work and as necessary to establish the exact position, orientation, and elevation of the work from control stations, including furnishing and setting construction stakes and marks, reference marks, and additional control stations. Plans, specifications, and other data necessary to lay out the work will be available for inspection at the Project Manager’s office.

B. Construction Survey, Stakes, Lines and Grades
   1. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. This work shall include locating or reestablishing project survey control, construction staking, including benchmarks, centerlines, and other measurements necessary for the proper execution of the project, and all surveying activities necessary to control the phases of work required to construct the project to the lines and grades as shown, specified, established, or required. The location or monumentation of any real property boundaries or easements required for construction shall be performed by or under the direct supervision of a Professional Land Surveyor registered in the State of Oregon. Prior to construction, Contractor shall check

with Columbia County for private property corners and stakes, as necessary. Prior to construction, the field layout shall be approved by the Owner's Representative.

2. The City shall provide available engineering surveys as necessary to establish reference points for construction which are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Construction Manager whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.
3. Existing control points in the area of the project are shown on the Drawings.
4. The Contractor shall not disturb permanent survey monuments, stakes, lot stakes, bench marks, or other permanent survey monumentation. The Contractor shall restore all such disturbed monumentation and the bear the expense of replacing any that are disturbed. In the case of destruction thereof by the Contractor or resulting from its negligence, the Contractor shall be charged with the expense and damage resulting therefore and shall be responsible for any mistakesthat may be caused by the unnecessary loss or disturbance of such benchmarks, reference points, private property corners, and stakes.
5. Survey work layout shall be from reference points, right of way lines, easement lines or other reference points shown on the drawings.
6. Staking of Right-of-Way: Where improvements appear to be within ten feet of a right of way line, the surveyor shall locate and stake such lines. The surveyor will locate sufficient representative survey monuments along the line to be staked so as to provide for reasonable accuracy for staking of the line.
7. Staking of Easements: The surveyor shall locate and stake both lines of the permanent easements within which any construction is being conducted. The surveyor will initially establish and stake an easement centerline within the easement. This centerline shall be established between existing manholes. The center of manholes will be established at the flow line in the pipe (not the manhole lid) and the centerline will then be established and staked to a reasonable level of accuracy. Stakes marking the easement centerline shall be so marked and set at each manhole at the beginning and end of the construction corridor and at 50-foot stations in between. From the established centerline of the easement, the permanent easement lines shall be staked. The stakes shall be set on each side lot line of each parcel and at 50-foot stations in between on each parcel.
8. Staking of New Utilities: The surveyor shall stake all new utilities constructed by the open cut method. The surveyor shall set line and grade and transfer to offset stakes at a maximum of 25-foot stations. The Contractor shall establish line and grade for the pipe construction using a laser or by transferring the line and grade from the offset stakes to the trench at the intervals necessary to maintain line and grade. During construction, the Contractor shall check line and grade at 25-foot intervals or less if necessary. Variance from the established line and grade shall not be greater than 1/32-inch per inch of pipe diameter and shall not exceed 1/2-inch from line and 1/4-inch for grade, providing that such variation does not result in a level or reverse-sloping invert. Variation in the invert elevation between adjoining ends of pipe, including fittings, shall not exceed 1/64-inch per inch of pipe diameter, or 1/2-inch maximum
9. Staking of Fences: The surveyor shall survey and record the location of all existing fences with respect to existing rights of way or easement lines or property corners or property lines. The surveyor will set offset stakes for all existing fences that will be partially or totally removed and replaced so that the fences can be reconstructed in the same location with reasonable accuracy.

C. Construction staking work will consist of all surveying activities necessary to control the phases of work required to construct the project to the lines and grades as shown, specified, established, or required. The construction surveyor shall make all supporting computations and field notes required for control of the work and as necessary to establish the exact position, orientation, and elevation of the work from control stations, including furnishing and setting

construction stakes and marks, reference marks, and additional control stations.

D. Based upon the information provided in the Contract Documents, the Contractor shall develop and make all detail surveys necessary for layout and construction, including exact component location, working points, lines and elevations. Prior to construction, the field layout shall be approved by the Owner's Representative. Prior to construction, Contractor shall check with Columbia County for private property corners and stakes, as necessary.

E. Protection of Survey Monuments:
   1. The Contractor shall not disturb permanent survey monuments, stakes, lot stakes, benchmarks, or other permanent survey monumentation. The Contractor shall check with Columbia County Surveyors Office for recorded property corners. The Contractor shall restore all such disturbed monumentation and the bear the expense of replacing any that are disturbed. In the case of destruction thereof by the Contractor or resulting from its negligence, the Contractor shall be charged with the expense and damage resulting therefore and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such benchmarks, reference points, private property corners, and stakes
   2. The Contractor shall preserve construction survey stakes and markers for the duration of their usefulness during construction. If survey stakes are lost or disturbed by the Contractor's and need to be replaced, the Contractor shall restore the stakes or markers and shall bear the expense of performing that work.
   3. At the completion of construction and upon approval of the Owner, the Contractor shall remove from the construction site all construction and temporary stakes and markers.

3.05 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Construction Manager of any discrepancies discovered.

C. Contractor shall locate and protect survey control and reference points.

D. Control datum for survey is that indicated on drawings.

E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

F. Promptly report to Construction Manager the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Construction Manager.

H. Utilize recognized engineering survey practices.

I. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

J. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.
   4. Controlling lines and levels required for mechanical and electrical trades.

K. Periodically verify layouts by same means.

L. Maintain a complete and accurate log of control and survey work as it progresses.

M. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.06 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-complying work.

C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.

I. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Prohibit traffic from landscaped areas.

H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Construction Manager and Owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

3.12 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 RESPONSIBILITY FOR DEFECTIVE WORK - SEE 01 22 00 UNIT PRICES

3.14 SITE RESORATION

A. All areas disturbed as a result of construction shall be restored to their original condition as nearly as possible or surfaced as shown on Plans. Replace all pavement in accordance with the minimum standards established by the City of St. Helens. Replace all sidewalk with base and surface materials conforming as closely as possible in thickness and quality to materials removed. All excess material shall be removed from the site.

B. Any damaged concrete walks or driveways shall be restored. All dirt and debris that accumulates from the Contractor’s operations shall be removed from manholes, pipelines, inlets, catch basins, and similar structures. Any material entering manholes or ditch culverts from work shall be removed. Daily cleanup of all visible mud and debris is required.

C. AThe contractor shall keep the premises clean and orderly at all times during the work and leave the project free of rubbish or excess materials of any kind upon completion of the work. During construction, the contractor shall stockpile excavated materials to do the least damage to adjacent lawns, grassed areas, gardens, shrubbery, trees, or fences, regardless of the ownership of these areas. All excavated materials shall be removed from these areas, and these surfaces shall be left in a condition equivalent to their original condition and free from all rocks, gravel, boulders, or other foreign material. Stockpiling of construction materials shall not be allowed on existing sidewalks or the driving surface of existing streets.

D. All existing storm systems shall be cleaned and flushed, and original drainage restored. Sediment, rock, and other debris shall be collected and disposed of in a proper manner. In no case shall debris be flushed down a storm or sanitary sewer for disposal. All damaged irrigation and house drainage pipe, drain tiles, sewer lateral, and culverts shall be repaired expeditiously.

E. All areas disturbed by the contractor's operations inside dedicated rights-of-way or easements shall be restored to original condition. Areas outside of the easements or rights-of-way which are disturbed by the contractor's operations shall be graded and reseeded in a method acceptable to the property owner. The contractor shall obtain a written release from such property owners for any claims of injury or property damage prior to final acceptance of the work by the city.

F. During all phases of the work, the contractor shall take precautions to abate any dust nuisance by cleaning up, sweeping, sprinkling with water, or other means as necessary to accomplish results satisfactory to the city. Dust prevention measures shall be continuous until final acceptance by the city. Obtaining water from a hydrant will require specific authorization from the public works department.

3.15 FINAL CLEANING

A. Contractor shall cleanup the project site(s), including landscaped areas, of rubbish, litter, and foreign substances. Temporary protection and facilities installed for protection of the work during construction shall be removed and the repair site to previous or better condition. Materials and debris become the property of the Contractor. Materials, debris, and waste materials shall be removed from the site and disposed of in a lawful manner. In general, final cleanup shall include,

1. retrim and reshape earthwork
2. repair deteriorated portions of the Project Site
3. restore or replace impacted facilities to their pre-existing condition
4. clean all drainage facilities and sanitary sewers of excess materials or debris resulting from the Work
5. clean up and leave in a neat, orderly condition, Rights-of-Way, materials sites, and other property occupied in connection with performance of the Work
6. remove temporary buildings, construction plants, forms, falsework and scaffolding, surplus and discarded materials, and rubbish
7. dispose of materials and debris, including, without limitation, forms, falsework, scaffolding, and rubbish resulting from clearing, grubbing, trimming, clean-up, removal, and other Work.

B. No separate or additional payment shall be made for final cleanup.

C. Execute final cleaning prior to final project assessment.

D. Use cleaning materials that are nonhazardous.

E. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

F. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

G. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

H. Clean filters of operating equipment.

I. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

J. Clean site; sweep paved areas, rake clean landscaped surfaces.

K. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.16 POST CONSTRUCTION SURVEY

A. The Contractor shall provide the Owner with post construction survey of all structures within the project, including structure locations, rim elevations and all invert elevations and directions of pipes in the structures, regardless of construction method. Post-construction survey shall be performed by an approved licensed surveyor.

B. Data Formats Provided by the Contractor shall be,
   1. AutoCAD Civil3D (.DWG) format
   2. Coordinate Data Points - ASCII Coordinate File format
   3. ASCII Coordinate File Format: Point ID, Northing, Easting, Elevation, Feature, Description

C. Contractor shall remove and dispose of all flagging, lath, stakes, and other temporary staking material after the Project is completed.

3.17 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Construction Manager and Owner.

B. Accompany Construction Manager on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Construction Manager when work is considered ready for Construction Manager's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Construction Manager's Substantial Completion inspection.

E. Conduct Substantial Completion inspection with Owner, Owner's Representative, and Construction Manager and create Final Correction Punch List containing Construction Manager's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Construction Manager.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Construction Manager when work is considered finally complete and ready for Construction Manager's Substantial Completion final inspection.

H. Complete items of work determined by Construction Manager listed in executed Certificate of Substantial Completion.
   1. Unless stated otherwise, all punch list corrections shall be completed by Contractor within 30 days of issuance of Substantial Completion. The City reserves the right to complete any outstanding punch list work remaining after the thirty-day period at Contractor's expense.

I. A final inspection of the project will be scheduled with the Contractor to verify all outstanding deficiencies have been corrected and all punch list items have been corrected prior to Final Acceptance.

J. Once all corrective items have been addressed; the Contractor shall submit Exhibit F, Certificate of Completion of the Contract Documents.

K. Following the submission of the Certificate of Completion, the Contractor shall submit a signed, notarized copy of Exhibit G, Contractor's Release of Liens and Claims of the Contract Documents.

L. When the Work is complete, the Owner and Construction Manager will conduct a final review of the project for final acceptance and will verify that,
   1. the Work has been inspected for compliance with the Contract Documents.
   2. the Work has been completed in accordance with the Contract Documents and all known deficiencies have been addressed.
   3. all required shop drawings, catalog cuts, maintenance manuals, instruction manuals, test reports, samples, operational manuals, and all other submittals have been submitted and reviewed.
   4. all deliverables have been submitted and have been as accepted, including but not limited to redline construction drawings, as-built survey, inspection videos (if applicable), pre-construction and post-construction site documentation, etc.
   5. all tools, surplus materials, construction equipment, storage sheds, debris, waste, and temporary services have been removed from the job site.
   6. Job site has been cleaned of rubbish, litter, and other foreign substances, and all surface restoration has been completed.

M. The Contractor shall transfer to the City all unexpired manufacturers' warranties and guarantees for Materials and Equipment installed on the Project. Such warranties and guarantees shall recite that they are enforceable by the City.

N. If the Construction Manager's review reveals that the Work is complete and is in 100% compliance with all Contract Documents, the Contractor will be issued Exhibit H, Certificate of Final Completion.

3.18 FINAL PAYMENT - SEE SECTION 01 20 00

3.19 WARRANTY

A. The Work is guaranteed by the Contractor from the date of Final Acceptance by the City. The Contractor shall warranty all materials and equipment that it furnishes for a period of two (2) years from date of final acceptance (Exhibit H) of the work by the City. This warranty shall mean prompt attention to the correction and/or complete replacement of the faulty material or equipment. Within ten calendar days of written notification of defect(s), the Contractor or the Contractor's surety shall vigorously and continuously correct and repair the defects and all related damage. If the Contractor fails within ten days to proceed to comply with the terms of this warranty, the City may have the defects corrected by a third party at the expense of the Contractor. The Contractor and Contractor's surety shall be liable for all expenses incurred. In case of an emergency where delay would cause serious loss or damage, repairs may be made without notice to the Contractor and the Contractor or Contractor's surety shall pay the cost.

B. The Contractor's performance bond shall remain in effect during the warranty period. If, within the warranty period, repairs or changes are required in connection with the work, the Contractor shall promptly, without expense to the City:
   1. Place in satisfactory condition all guaranteed work
   2. Correct all damage to the site, equipment or contents which is the result of the use of materials, equipment or workmanship that are inferior, defective, or not in accordance with the terms of the contract; and,
   3. Correct any work, material, equipment, or contents of building, structure or site disturbed in fulfilling the guarantee.

C. Repairs, replacements, or changes made under the warranty requirements shall be warranted for the specified warranty period beginning on the date of the acceptance of the repairs, replacements or changes. The expiration of the two-year warranty period shall not affect any other claims or remedy available to the City.

3.20 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than 2 years from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 01 70 00

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

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

D. Owner may decide to pay for additional recycling, salvage, and/or reuse based on Landfill Alternatives Proposal specified below.

E. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

F. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

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

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

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: List of items to be salvaged from the existing building for relocation in project or for Owner.

B. Section 01 30 00 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. Section 01 50 00 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.

D. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.

E. Section 01 70 00 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

F. Section 31 10 00 - Site Clearing: Handling and disposal of land clearing debris.

1.03 DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Landfill Alternatives Proposal: Within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner, submit a projection of trash/waste that will require disposal and alternatives to landfilling, with net costs.
   1. Submit to Owner's Representative for Owner's review and approval.
   2. If Owner wishes to implement any cost alternatives, the Contract Price will be adjusted as specified elsewhere.
   3. Include an analysis of trash/waste to be generated and landfill options as specified for Waste Management Plan described below.
   4. Describe as many alternatives to landfilling as possible:
      a. List each material proposed to be salvaged, reused, or recycled.
      b. List the proposed local market for each material.
      c. State the estimated net cost resulting from each alternative, after subtracting revenue from sale of recycled or salvaged materials and landfill tipping fees saved due to diversion of materials from the landfill.
   5. Provide alternatives to landfilling for at least the following materials:
      a. Aluminum and plastic beverage containers.
      b. Corrugated cardboard.
      c. Wood pallets.
      d. Clean dimensional wood.
      e. Land clearing debris, including brush, branches, logs, and stumps.
      f. Concrete.
      g. Bricks.
      h. Concrete masonry units.
      i. Asphalt paving.
      j. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.

C. Once Owner has determined which of the landfill alternatives addressed in the Proposal above are acceptable, prepare and submit Waste Management Plan; submit within 10 calendar days

after notification by Construction Manager.

D. Waste Management Plan: Include the following information:
   1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
   2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
   3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
   4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
   5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
   6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

E. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
   1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
   2. Submit Report on a form acceptable to Owner.
   3. Landfill Disposal: Include the following information:
      a. Identification of material.
      b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
      c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   4. Incinerator Disposal: Include the following information:
      a. Identification of material.
      b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
      c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   5. Recycled and Salvaged Materials: Include the following information for each:
      a. Identification of material, including those retrieved by installer for use on other projects.
      b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
      c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
      e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
   6. Material Reused on Project: Include the following information for each:
      a. Identification of material and how it was used in the project.
      b. Amount, in tons or cubic yards.
      c. Include weight tickets as evidence of quantity.

7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

A. See Section 01 60 00 - Product Requirements for substitution submission procedures.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 10 00 for list of items to be salvaged from the existing building for relocation in project or for Owner.

B. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

C. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.

D. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.

E. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Construction Manager.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION 01 74 19

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Construction Manager with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Owner's Representative comments. Revise content of all document sets as required prior to final submission.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Addenda.
   3. Change Orders and other modifications to the Contract.
   4. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Field changes of dimension and detail.

3. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
   2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Additional information as specified in individual product specification sections.

D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Construction Manager, Owner's Representative, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Operation and maintenance data.
      c. Field quality control data.
      d. Photocopies of warranties and bonds.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION 01 78 00

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

A. City of St. Helens Special Provision 02410: Refer to City spec for demolition and disposal requirements.

B. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

C. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

D. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

E. Section 01 57 13 - Temporary Erosion and Sediment Control.

F. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.

G. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

H. Section 01 74 19 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

I. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.

J. Section 31 22 00 - Grading: Topsoil removal.

K. Section 31 22 00 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

L. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 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.

1.04 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: See Section 31 23 23.

PART 3 EXECUTION

3.01 DEMOLITION

A. Remove concrete slabs on grade within site boundaries.

B. Remove fences and gates.

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 Section 31 22 00.

3.02 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. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
   6. 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.
   7. 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. 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.

3.03 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.

3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02 41 00

SECTION 03 05 16
UNDERSLAB VAPOR BARRIER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheet vapor barrier under concrete slabs on grade.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Preparation of subgrade, granular fill, placement of concrete.

1.03 REFERENCE STANDARDS

A. 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.

B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs 2017.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products.

C. Test Data: Submit report of tests showing compliance with specified requirements.

D. Samples: Submit samples of underslab vapor barrier to be used.

E. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Underslab Vapor Barrier:
   1. Water Vapor Permeance: Not more than 0.010 perms (0.6 ng/(s m2 Pa)), maximum.
   2. Complying with ASTM E1745 Class A.
   3. Thickness: 15 mils (0.4 mm).
   4. Basis of Design:
      a. Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): www.stegoindustries.com/#sle.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface over which vapor barrier is to be installed is complete and ready before proceeding with installation of vapor barrier.

3.02 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches (150 mm).

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.

F. Repair damaged vapor retarder before covering with other materials.

END OF SECTION 03 05 16

SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

B. Openings for other work.

C. Form accessories.

D. Form stripping.

1.02 RELATED REQUIREMENTS

A. Section 03 20 00 - Concrete Reinforcing.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 05 12 00 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

1.04 REFERENCE STANDARDS

A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).

B. ACI 301 - Specifications for Concrete Construction 2020.

C. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).

D. ACI 347R - Guide to Formwork for Concrete 2014 (Reapproved 2021).

E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.

F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.

G. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.

H. PS 1 - Structural Plywood 2009 (Revised 2019).

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on void form materials and installation requirements.

C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

D. Samples: Submit two, 12 inch long samples of waterstops and construction joint devices.

E. Designer's Qualification Statement.

F. Design Data: As required by authorities having jurisdiction.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design formwork under direct supervision of a Professional Structural Engineer experienced in design of concrete formwork and licensed in Oregon.

B. Maintain one copy of each installation standard on site throughout the duration of concrete work.

1.07 MOCK-UP

A. Construct a mock-up of formwork for site wal[ls, 4 feet long by 4 feet wide.

1. Include reinforcement, ties, and accessories specified in Section 03 20 00.
2. Provide concrete in accordance with provisions of Section 03 30 00.
3. Cure concrete in accordance with provisions of Section 03 30 00.

B. Locate mock-up where directed.

C. Mock-up may remain as part of the Work.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.

C. Chamfer outside corners of beams, joists, columns, and walls.

D. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

E. Comply with relevant portions of ACI 347R, ACI 301, and ACI 318.

2.02 WOOD FORM MATERIALS

A. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I for surfaces exposed to public view.

2.03 REMOVABLE PREFABRICATED FORMS

A. Manufacturers:
1. Fitzgerald Formliners, Graylastic: www.formliners.com.
   a. Pattern: Pattern 16920 Random Wood, 0.75" deep, random width, medium grain planks.
   b. Material: Elastomeric Urethane.
   c. Orientation: Vertical
2. Substitutions: See Section 01 60 00 - Product Requirements.
3. Locations of Use: Concrete retaining wall along riverbank north and south of existing gangway.

2.04 FORMWORK ACCESSORIES

A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
1. Do not use materials containing diesel oil or petroleum-based compounds.
2. Composition: Colorless, reactive, water-based compound.
3. Composition: Colorless, reactive, solvent-based compound.
   a. VOC Content: In compliance with applicable local, State, and federal regulations.

C. Dowel Sleeves: Plastic sleeve and nailable plastic base for smooth, round, steel load-transfer dowels.

D. Filler Strips for Chamfered Corners: Rigid plastic type; 1 x 1 inch size; maximum possible lengths.

E. Dovetail Anchor Slot: Galvanized steel, at least 22 gauge, 0.0299 inch thick, foam filled, release tape sealed slots, anchors for securing to concrete formwork.

F. Flashing Reglets: Galvanized steel, at least 22 gauge, 0.0299 inch thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork. Provide _____ manufactured by _____ .

G. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

H. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 05 12 00.

I. Waterstops: Preformed mineral colloid strips, 3/8 inch thick, moisture expanding.
   1. Manufacturers:
      a. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
   1. At formwork for exposed concrete, lay out form ties in a regular pattern for review by the Owner's Representative.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

E. Obtain approval before framing openings in structural members that are not indicated on drawings.

F. Coordinate this section with other sections of work that require attachment of components to formwork.

G. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Owner's Representative before proceeding.

3.03 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.04 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

D. Position recessed anchor slots for brick veneer masonry anchors to spacing and intervals specified in Section 04 26 13.

E. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

F. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement.

G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.05 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.06 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 117, unless otherwise indicated.

3.07 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

C. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view . Do not patch formwork.

3.08 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION 03 10 00

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 - Buy America Certification Procedures.

B. Section 03 10 00 - Concrete Forming and Accessories.

C. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

A. ACI 301 - Specifications for Concrete Construction 2020.

B. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).

C. ACI SP-66 - ACI Detailing Manual 2004.

D. ASTM A184/A184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement 2019.

E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.

F. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement 2019, with Editorial Revision.

G. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement 2022a.

H. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement 2016.

I. ASTM A1035/A1035M - Standard Specification for Deformed and Plain, Low-Carbon, Chromium, Steel Bars for Concrete Reinforcement 2020.

J. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.

K. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.

L. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars 2018, with Amendment (2020).

M. CRSI (DA4) - Manual of Standard Practice 2018, with Errata (2019).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 - Buy America Certification Procedures for certification requirements.

C. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

   1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in Oregon.

D. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

E. 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.

F. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301.

B. Provide Owner's Representative with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.4/D1.4M.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Plain billet-steel bars.
   2. Unfinished.

B. Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.
   1. Unfinished.

C. Reinforcing Steel: Deformed bars, ASTM A996/A996M Grade 40 (280), Type A.

D. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.
   1. Form: Flat Sheets.
   2. WWR Style: 4 x 8-W6 x W10.

E. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
   3. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.

2.02 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Welding of reinforcement is not permitted.

C. Locate reinforcing splices not indicated on drawings at point of minimum stress.
   1. Review locations of splices with Owner's Representative.

PART 3 EXECUTION

3.01 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Maintain concrete cover around reinforcing as follows as indicated on the Drawings.

E. Comply with applicable code for concrete cover over reinforcement.

3.02 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 40 00 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION 03 20 00

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete site retaining walls.

B. Concrete seatwalls.

C. Elevated concrete slabs.

D. Floors and slabs on grade.

E. Joint devices associated with concrete work.

F. Miscellaneous concrete elements, including equipment pads, equipment pits, light pole bases, thrust blocks, and manholes, and stair treads and landings.

G. Concrete curing.

H. Concrete finishing.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 03 10 00 - Concrete Forming and Accessories: Forms and accessories for formwork.

C. Section 03 20 00 - Concrete Reinforcing.

D. Section 03 50 16 - Underslab Vapor Barrier.

E. Section 07 92 00 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

F. Section 31 23 23 – Fill.

G. Section 32 11 23 – Aggregate Base Courses.

H. Section 32 13 00 - Site Concrete.

1.03 REFERENCE STANDARDS

A. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide 2022.

B. ACI 301 - Specifications for Concrete Construction 2020.

C. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).

E. ACI 305R - Guide to Hot Weather Concreting 2020.

F. ACI 306R - Guide to Cold Weather Concreting 2016.

G. ACI 308R - Guide to External Curing of Concrete 2016.

H. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).

I. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.

J. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.

K. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.

L. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.

M. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.

N. ASTM C150/C150M - Standard Specification for Portland Cement 2022.

O. ASTM C157/C157M - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete 2017.

P. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2020.

Q. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).

R. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).

S. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2022.

T. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.

U. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.

V. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.

W. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures 2020.

X. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete 2019.

Y. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.

Z. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.

AA. 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.

BB. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs 2017.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

C. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

D. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
   3. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   4. Indicate amounts of mixing water to be withheld for later addition at project site.

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.

G. Sustainable Design Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland

cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.

H. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

I. Floor surface flatness and levelness measurements to determine compliance with specified tolerences.

J. Minutes of preinstallation conference.

K. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

L. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

1.06 MOCK-UP

A. Construct and erect mock-up panel for architectural concrete surfaces indicated to receive special treatment or finish as result of formwork. 6 by 6 feet, including all joints, finishes, curing and sealant materials. Include:
   1. Type 1 – Sand finish with sawcut joints
   2. Type 2 – Broom finish with tooled joints
   3. Locate where directed.
   4. Coordinate with Work of Section 03 10 00 - Concrete Forming and Accessories for form liners to be used on one-half of the mock-up.
   5. Accepted mock-up panel is considered basis of quality for the finished work. Keep mock-up exposed to view for duration of concrete work.
   6. Mock-up may remain as part of the Work.

B. Construct and erect mock-up for site walls. Coordinate with Work of Section 03 10 00 - Concrete Forming and Accessories for form liners to be used on one-half of the mock-up.
   1. Panel Size: 4 x 4 feet for each condition.
   2. Number of panels: One.
   3. Locate where directed.
   4. Accepted mock-up panel is considered basis of quality for the finished work. Keep mock-up exposed to view for duration of concrete work.
   5. Mock-up may remain as part of the Work.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 10 00.

2.02 REINFORCEMENT MATERIALS

A. Comply with requirements of Section 03 20 00.

2.03 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.

2. Maximum Size: 1-1/2 inches and not more than 1/5 of narrowest dimension between sides of forms, 1/3 depth of flatwork, or 3/4 of narrowest space between reinfocing bars.

C. Fly Ash: ASTM C618, Class C or F.

D. Calcined Pozzolan: ASTM C618, Class N.

E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.

F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

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

B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

C. Air Entrainment Admixture: ASTM C260/C260M.

D. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

E. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

F. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

G. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

H. Accelerating Admixture: ASTM C494/C494M Type C.

I. Retarding Admixture: ASTM C494/C494M Type B.

J. Water Reducing Admixture: ASTM C494/C494M Type A.

K. Shrinkage Reducing Admixture:
   1. ASTM C494/C494M, Type S.

2.05 ACCESSORY MATERIALS

A. Underslab Vapor Barrier: Comply with requirements of Section 03 05 16 .

B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Grout: Comply with ASTM C1107/C1107M.
   2. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.
   3. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.

C. Coatings, General: Provide products with VOC limits as established in Section 01 61 16.

D. Sealer SC-1: ASTM C1315, Type 1, Class A, ASTM C309, Type 1 Class A, penetrating product with no less than 34 percent solids content, leaving no sheen, VOC content rating as required to suit regulatory requirements with a 5 year documented history in controlling moisture vapor emission from damaging floor coverings.

E. Sealer SC-2: Clear, chemically reactive, waterborne solution of incorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

F. Expansion and Isolation Joint Filler Strips: ASTM D1751, Sealtight 1/2 inch thick Ceramar Flexible Foam Expansion Joint Filler as manufactured by W.R. Meadows, Inc., P.O. Box 543, Elgin, Il., 60121, (708) 683-4500.

G. Expansion Joint Sand: Silica Quartz sand to match color of adjacent paving.

2.06 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: Preformed mineral colloid strips, 3/8 inch thick, moisture expanding.

D. Reglets: Formed steel sheet, galvanized, with temporary filler to prevent concrete intrusion during placement.

E. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
   1. Material: ASTM D1751, cellulose fiber.

F. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.

G. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches on center; ribbed steel stakes for setting.
   1. Provide removable plastic cap strip that forms wedge-shaped joint for sealant installation.
   2. Height: To suit slab thickness.

2.07 CURING MATERIALS

A. Moisture-Retaining Sheet: ASTM C171.
   1. Curing paper, regular.
   2. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch.
   3. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

B. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

A. Reference General Structural Notes (S0.01) for the requirements for all concrete shown on the Structural drawings.

B. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, with the following properties:
   1. Minimum Compressive Strength: f'c = 3,500 psi in 28 days.
      a. Minimum Compressive Strength for Foundations: f'c = 2,500 psi in 28 days.
   2. Maximum Aggregate Size: 3/4 inch.
   3. Maximum Slump for Footings, Walks, Curbs, Exterior Slabs, and Floor Slabs: 4 inches + 1/2 to - 1 inch.
   4. Maximum Slump for Foundation Walls: 3 inches + 1/2 to - 1 inch.
   5. Air Content: 4.5 to 7.0 percent.
   6.. Water/Cement Ratios: 0.50.

C. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
   1. Mix full load of concrete for 3 minutes at high speed upon arrival at site.
   2. Mix concrete for an additional 5 minutes after adding water.

PART 3 EXECUTION

2.09 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

2.10 PREPARATION

A. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

B. 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.

C. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

D. Install vapor retarder in complaince with Section 03 05 16 .

E. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

2.11 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify Owner's Representative not less than 24 hours prior to commencement of placement operations.

D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

2.12 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.
   1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.

D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

E. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Owner's Representative
   1. Place joints perpendicular to reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement throuh sides of strip placements of floors and slabs.

2.13 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. An independent testing agency, as specified in Section 01 40 00, will inspect finished slabs for compliance with specified tolerances.

B. Maximum Variation of Surface Flatness:
   1. Exposed Concrete Floors: 1/4 inch in 10 feet.
   2. Under Seamless Resilient Flooring: 1/4 inch in 10 feet.
   3. Under Carpeting: 1/4 inch in 10 feet.

C. Correct the slab surface if tolerances are less than specified.

D. 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.

2.14 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch 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.

D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Exterior Steps, Ramps and Pathways: "Broom Finish." Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to foot traffic route. Coordinate required final finish with Owner's Representative before application.
   2. Sand Finish where indicated on drawings.
   3. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

2.15 MISCELLANEOUS CONCRETE ITEMS

A. Filing 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. Curbs:

C. Play Equipment and Site Furnishing Foundations:

2.16 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. 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.
   2. High early strength concrete: Not less than four days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. 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. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.

E. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; 4,000 psi.

2.17 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

2.18 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Owner's Representative 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's Representative. 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's Representative for each individual area.

2.19 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION 03 30 00

SECTION 04 43 00 - STONE MASONRY

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes stone in the following applications:

1. Stacked Basalt Seatwall
2. Basalt Seating
3. Basalt Column Retaining Wall
4. Basalt Veneer

1.02 RELATED SECTIONS

1. Section 03 30 00 – Cast-In-Place Concrete
2. Section 32 13 00 – Site Concrete

1.03 SUBMITTALS

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

B. Include test data for each stone variety proposed indicating compliance with physical properties specified.

D. Stone Samples: Site visit for Landscape Architect to approve stone samples.

1. Accepted samples will establish standard for completed Work.

E. Coordinate below with qualification requirements in Division 1 Section "Quality Requirements" and as supplemented in "Quality Assurance" Article.

F. Qualification Data: For Installer.

G. Submittals for Information only:

1. List of materials used in mockup, including generic and manufacturer's product names, sources of supply, and other information required to identify materials.
2. Mortar mixes and source of aggregates.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company experienced in installation of stonework of type specified, with five years' experience, under present name.

B. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Build mockup of basalt column retaining wall approximately 4 feet long by height shown in drawing, include a minimum of one vertical column, one horizontal column, a single depth, and a double depth relationship. Obtain Owner's Representative approval of the mock-up before proceeding with the rest of work.
2. Build mockup of one basalt seating area. Obtain owner's representative approval of the mockup before proceeding with the rest of the work.
3. Build mockup of one stacked basalt seatwall approximately 4ft long by height shown on drawing. Obtain owner's representative approval of the mockup before proceeding with the rest of the work.

4. Build mockup of basalt veneer at Stage approximately 4 feet long along vertical face and at finish surface of stage. Obtain owner's representative approval of the mockup before proceeding with the rest of the work.

5. Approved mockups may become part of the completed Work.

   a. Protect mockup from elements of weather.

   b. Document in writing any changes from specifications approved by Owner in mockup.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious material on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that become damp.

B. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

D. Store masonry accessories to prevent corrosion and accumulation of dirt and oil.

1.06 PROJECT CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls and projections with waterproof sheeting at end of each day's work.

   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining the face of stone masonry.

   1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.07 COORDINATION

A. Coordinate with Work of other Sections placement of reinforcement, veneer anchors, flashing, and similar items built into stone masonry.

PART 2 - PRODUCTS

2.01 STONE MATERIAL

A. General Requirements:

   1. Provide Camas Black Basalt or approved equal.

2. Provide stone without sharp edges or points.

3. Provide stone that is solid and not flaking in any way.

4. Install stone set firmly in the ground and without tip, wiggle, or waver in anyway.

B. Stone Products: Uniform, medium-grained, gray stone, matching approved samples for color, finish, and other stone characteristics relating to aesthetic effects. Subject to compliance with requirements, provide the following:

1. Camas Black Basalt Columns, horizontal, 42”- 60” Long, 12” - 18” Diameter.

2. Camas Black Basalt Columns, vertical, 18” – 24” Long, 12” - 18” Diameter.

a. Finish: Sawcut and Bush Hammer Tops of Columns, ease all edges and top corners.

3. Stone Veneer - Camas Black Basalt, 6”-16” squares and rectangles, 3”-4” thick.

4. Stacked Stone - Camas Black Basalt, size and pattern to match basalt Stone veneer, ease all exposed edges and top corners.

2.02 MORTAR MATERIALS

A. Mortar Cement: ASTM C 1329.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Lafarge North America; Lafarge Mortar Cement or Magnolia Superbond Mortar Cement.

b. Or approved equal.

B. Aggregate: ASTM C 144.

1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 sieve.

2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

a. Match Owner's sample.

C. Water: Potable.

2.03 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Diedrich Technologies, Inc.

b. Dominion Restoration Products.

c. EaCo Chem, Inc.

d. Hydrochemical Techniques, Inc.

e. Prosoco, Inc.

f. Or approved equal

2.04 MORTAR MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride.

2. Limit cementitious materials in mortar to Portland cement and lime.

3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

4. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Stone Masonry: Comply with ASTM C 270.

1. Mortar for Setting Stone: Type S.

2.05 FABRICATION

A. Fabricate stone to comply with sizes, shapes, and tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs. See plans for sizes and finishes.

B. Cut stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.

C. Carefully observe stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.

1. Clean sawed backs of stone to remove rust stains and iron particles.

D. Thickness of Stone: Provide thickness indicated on drawings.

E. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.

1. Finish: Rock face (pitched face).

a. Finish exposed ends of caps same as front faces.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SETTING OF STONE MASONRY, GENERAL

A. Perform necessary field cutting and trimming as stone is set.

1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.

2. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.

3. Pitch face at field-split edges as needed to match stones that are not field split.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stone in pattern shown on drawings as close as possible.

D. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

F. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 1/4 inch at narrowest points or more than 5/8 inch at widest points.

G. Provide sealant joints of widths and at locations indicated.

1. Keep sealant joints free of mortar and other rigid materials.

2. Sealing joints is specified in Section 07 9200, Section "Joint Sealants."

3.03 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet or 3/4 inch in 40 feet or more.

D. Measure variation from level, plumb, and position shown in plan as variation of the average plane of the face of each stone from level, plumb, or dimensioned plane.

E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.

F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

3.04 ADJUSTING AND CLEANING

A. Remove and replace stone masonry of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Owner.

2. Defective joints.

3. Stone masonry not matching approved samples and mockups.

4. Stone masonry not complying with other requirements indicated.

B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Owner's approval of sample cleaning before cleaning stone masonry.

3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.

4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.

5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution.

6. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions. 7. Clean limesto Raking out joints to depth of 3/4 inch (19 mm) allows for 2 layers of pointing mortar approximately 3/8 inch (10 mm) deep.

3.05 EXCESS MATERIALS AND WASTE

A. Excess Stone: Stack excess stone where directed by Owner for Owner's use. Remove from site following acceptance or work.

B. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in greatest dimension.

2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31 Section "Earth Moving."

3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural steel framing members.

B. Structural steel support members and struts.

C. Base plates, shear stud connectors and expansion joint plates.

D. Grouting under base plates.

1.02 SUMMARY

A. Comply with Contract Build America, Buy America Provisions.

1.03 STANDARD AND REGULATORY REQUIREMENTS

A. "Build America, Buy America" Requirements: All manufactured products listed within this specification section are part of a federally assisted procurement involving funds granted by the Department of the Interior (DOI) and shall comply with Build America, Buy America Act requirements as delineated in Section 1. Items listed in these specifications which fall under the Act have been researched to indicate preliminary compliance with the Basis of Design functional requirements. Bidders are expected to confirm compliance with all materials and/or products which require compliance with the BABA. The Contractor is required to obtain a Certificate of Materials Origin for all products subject to the BABA.

1.04 REFERENCE STANDARDS

A. AISC (MAN) - Steel Construction Manual 2017.

B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2016.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.

E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.

G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

H. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality 2019.

I. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric) 2021a.

J. ASTM A992/A992M - Standard Specification for Structural Steel Shapes 2020.

K. 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 2018a.

L. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions 2019.

M. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength 2020.

N. 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.

O. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.

P. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.

Q. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).

R. SSPC-SP 3 - Power Tool Cleaning 2018.

1.05 SUBMITTALS

A. See Section 01 30 00 - 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. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.

E. Fabricator Test Reports: Comply with ASTM A1011/A1011M.

F. 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.

G. Fabricator's Qualification Statement.

H. Certification: Certificates or certified test results submitted by the Contractor which demonstrate proof of compliance with the Specifications for products, materials, equipment, systems, and qualifications of personnel, manufacturers, fabricators, and installers including Certificate of Materials Origin for materials subject to Build America, Buy America requirements. “Build America, Buy America” Certificates: “Build America, Buy America” certificates required during bidding shall also be required as part of each product submittal. Certificates shall be complete and accurate. Certificates shall indicate either compliance or non-compliance with the “Build America, Buy America” regulations. Certificates of non-compliance shall also include copies of any granted waivers.

1.06 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."

B. Structural steel members designated as architecturally-exposed structural steel (AESS) to also comply with Section 05 12 13.

C. 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.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel Angles and Plates: ASTM A36/A36M.

B. Steel W Shapes and Tees: ASTM A992/A992M.

C. Steel Shapes, Plates, and Bars: ASTM A529/A529M high-strength, carbon-manganese structural steel, Grade 50.

D. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade C.

E. Pipe: ASTM A53/A53M, Grade B, Finish galvanized.

F. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.

G. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.

H. Tension Control Bolts: Twist-off type; ASTM F3125/F3125M.

I. Unheaded Anchor Rods: ASTM F1554, Grade 55, plain, with matching ASTM A563/A563M nuts and ASTM F436/F436M Type 1 washers.

J. Headed Anchor Rods: ASTM F1554 Grade 55, plain.

K. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

L. 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).

2.02 FABRICATION

A. Shop fabricate to greatest extent possible.

2.03 FINISH

A. Prepare structural component surfaces in accordance with SSPC-SP 3.

B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

2.04 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.

2.05 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

3.01 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. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

E. 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.

3.02 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).

3.03 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

END OF SECTION 05 12 00

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 05 12 00 - Structural Steel Framing: Structural steel column anchor bolts.

1.02 SUMMARY

A. Comply with Contract Build America, Buy America Provisions.

1.03 STANDARD AND REGULATORY REQUIREMENTS

A. "Build America, Buy America" Requirements: All manufactured products listed within this specification section are part of a federally assisted procurement involving funds granted by the Department of the Interior (DOI) and shall comply with Build America, Buy America Act requirements as delineated in Section 1. Items listed in these specifications which fall under the Act have been researched to indicate preliminary compliance with the Basis of Design functional requirements. Bidders are expected to confirm compliance with all materials and/or products which require compliance with the BABA. The Contractor is required to obtain a Certificate of Materials Origin for all products subject to the BABA.

1.04 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.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative 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.

D. Certification: Certificates or certified test results submitted by the Contractor which demonstrate proof of compliance with the Specifications for products, materials, equipment, systems, and qualifications of personnel, manufacturers, fabricators, and installers including Certificate of Materials Origin for materials subject to Build America, Buy America requirements. “Build America, Buy America” Certificates: “Build America, Buy America” certificates required during bidding shall also be required as part of each product submittal. Certificates shall be complete and accurate. Certificates shall indicate either compliance or non-compliance with the “Build America, Buy America” regulations. Certificates of non-compliance shall also include copies of any granted waivers.

1.06 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

2.01 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.

2.02 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.

2.03 FABRICATED ITEMS

A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

2.04 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.)

2.05 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).

2.06 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.

2.07 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

3.01 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.

3.02 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 05 50 00

SECTION 05 70 00 - SITE RAILINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Provide all material, labor, equipment, and services necessary for the furnishing and installation of a complete handrail and guardrail system, as specified herein.

B. Exterior handrail, guardrails, and guardrails with handrails as indicated on landscape architecture drawings (L-series).

C. Confirm structural performance as defined in ASTM E 985 (as modified by the IBC) based on structural computations.

1.02 RELATED SECTIONS

A. Refer to the General Conditions, Supplementary Conditions and Division 1 General Requirements.

B. Section 01 40 00 - Quality Requirements.

C. Section 01 60 00 - Product Requirements

D. Section 09 96 00 - High-Performance Coatings

E. Section 32 13 00 - Site Concrete

1.03 SUBMITTALS

A. Submittals shall be made in according with the requirements of Section 01 30 00, except as noted herein.

B. Product Data:

1. Submit manufacturer's product specifications, anchor details and installation instructions for products used in work, including paint products, lighting and electrical devices.

2. Submit qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects identifying project name, address, Designer and Owner.

C. Shop Drawings:

1. Based on precise measurements of as-built site conditions submit complete shop drawings for fabrication and installation of work and related work including plans, elevations and details of components and attachments to other work. Indicate materials and profiles of each member, fitting, joinery, finishes, fasteners, anchorages and accessory items. Provide shop drawings at least 30 days prior to scheduled beginning of fabrication.

2. For structural elements include details of cuts, connections, camber, holes and other pertinent data. Indicate welds by standard AWS symbols and show size, length and type of each weld.

3. Provide setting drawings, templates and directions for the installation of anchor bolts and other anchorages to be installed in work described in other sections.

D. Materials & Finish Samples: Submit samples of each component material showing finishes, colors, and surface textures.

E. Completed Product Samples: Upon approval of all material and finish samples, submit full-size sample assemblies of the following:

1. Handrail: entire handrail assembly showing welds, form, and finish.
2. Handrail Wood Cap: 12” long section showing typical wood quality, form, and finish.
3. Guardrail: entire handrail assembly showing welds, form, and finish.
4. Guardrail with handrail: entire assembly showing welds, form, and finish.

F. Maintenance Data: Include cleaning recommendations. Provide information on methods and products for field paint repair and graffiti removal.

1.04 CODES, ORDINANCES AND REGULATIONS

A. The completed installation shall conform to all applicable Federal, State and local codes, ordinances and regulations.

B. Obtain all necessary permits and inspections required by the governing authorities having jurisdiction over this work. Include associated fees in initial proposal.

C. Furnish to the Owner a certificate of approval from the inspection authority at the completion of the work prior to the application for final payment.

D. Where specified materials or methods exceed minimum standards allowed by applicable codes, the more stringent requirement shall apply.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed work similar in material, design, and extent indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with the American Welding Society (AWS) "Standard Qualification Procedure".

C. Fabrication Observation: Notify Designer for inspection prior to completion of structures to schedule review of work in progress.

1.06 PERFORMANCE REQUIREMENTS

A. Expansion & Contraction: Design, fabricate and install component parts to provide for expansion and contraction of the material over a temperature range of 100 degrees F. (83.3 degrees C.), without buckling, sealant joint failure, glass breakage, undue stress on members and anchors, or other detrimental effects.

B. Fabrication Tolerances: Steel panels shall show no visual distortion when viewed in installed position.

C. Panel Alignment at Butt Joints: Steel panels shall align parallel and flat without visible variation when viewed from the normal viewing distance.

1.07 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to insure proper fitting of work.

1.08 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Deliver work to project site when adjacent finishes are complete and ready for immediate installation.

B. Handling Materials and Equipment: Handle finished product in careful manner in order not to damage or mar surfaces of finished product or adjacent finished surfaces.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Other manufacturer's products of equal or greater quality than those specified in this section may be used. See Section 016000 for further information concerning equivalent materials, products, or services.

2.02 METALS

A. Stainless Steel: Provide austenitic stainless steel in form indicated complying with the following American Society for Testing Materials (ASTM) requirements:

1. Sheet: ASTM A240, Type 304.
2. Extrusion: ASTM A167.
3. Bar: ASTM A240.
4. Plate: ASTM A167.
5. Angle: ASTM A240, Type 304.
6. Pipe: ASTM A240, Type 304.

B. Weathering steel: Provide weathering steel plates, shapes and bars in the form indicated complying with ASTM A 588, Grade. A (USS COR-TEN B). Thickness specified on drawings. Provide materials that have been selected for their surface flatness, smoothness, consistency and freedom from surface blemishes wherever exposed to view in the finish unit.

2.03 WOOD CAP

A. All lumber shall be kiln-dried to the average moisture content as recommended by the AWI Quality Standards; latest edition appropriate for the regional climatic conditions of the project site.

B. Wood Type: FSC certified Alaskan Yellow Cedar, grade C and better clear.

C. Finish: Sand smooth and apply two coats of Internal Wood Stabilizer (TimberPro Coatings - 503-232-1705) per manufacturer's recommendations.

D. Fasteners: Stainless steel screws.

2.04 MISCELLANEOUS PRODUCTS AND MATERIALS

A. Fasteners: Of same basic metal and alloy as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or otherwise incompatible with metals joined.

1. Fastening devices between dissimilar materials shall be 300 Series non-magnetic stainless steel bolts.
2. Material: Galvanically compatible with adjacent materials.
3. Finish: Where exposed to view match adjacent material.
4. Provide concealed fasteners for interconnection of metal work components and for their attachment to other work except where exposed fasteners are indicated on the drawings.
5. Provide socket flat-head machine screws or bolts for exposed fasteners, unless otherwise indicated.

B. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS

specifications, and as required for color match, strength and compatibility in the fabricated items.

2.05 METAL FABRICATION

A. General:

1. Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.

2. For exposed work fabricate true to line and level with accurate angles and surfaces and straight sharp edges. Exposed edges shall be square unless otherwise shown. Ease corners and edges where exposed to public touch. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

3. Provide metal work composed of metals of the forms and types which comply with requirements of referenced standards, and which are free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, "oil canning", stains, discolorations or other imperfections on finished units will not be accepted.

4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, socket flat-head screws or bolts.

5. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

6. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

B. Welded Construction:

1. Select type of weld for best appearance. Use concealed and plug welds wherever possible.

2. Comply with American Welding Standards (AWS) Code for procedures, appearance and quality of welds, and methods used in correcting welding work. Select weld sizes, sequence and equipment to limit distortions to allowable tolerances. Surface "bleed" of backside welding on exposed surfaces will not be accepted.

3. Assemble and weld structural system by methods that will produce true alignment of axes without warp. Grind butt welds flush; dress all exposed welds, feather edges onto base material and polish as required for smooth painted surfaces.

4. Weld corners and seams continuously, complying with AWS recommendations. All exposed welds shall be clean, consistent and uniform in appearance. Grind and finish exposed welds to match adjacent contours and finish. Remove loose rust, mill scale, and spatter, slag or flux deposits.

C. Miscellaneous Trim and Hardware:

1. Provide shapes and sizes as required for profiles shown. Except as otherwise noted, fabricate units from structural steel shapes, plates and bars, with continuously welded joints and smooth exposed edges. Use concealed field

splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.

2. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for supporting of metal work.

3. Fabricate items to sizes, shapes and dimensions required.

D. Shop Assembly:

1. Fabricate units to configurations indicated on reviewed shop drawings.

2. Provide required text and artwork as indicated on reviewed shop drawings.

3. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

E. Surface Preparation: After inspection and before finishing, clean metal work to be painted. Clean metal by "wheel abrader" process or other method to achieve results defined by Steel Structures Painting Council (SSPC) for "SP-6 Commercial Blast Cleaning".

F. Preparation for Shipping and Handling: Provide strippable protective coating or wrapping.

2.06 METAL FINISHES

A. General:

1. Complete cutting, fitting, forming, drilling and grinding of metal work prior to cleaning, finishing, surface treatment and application of finishes.

2. Comply with National Association of Architectural Metal Manufacturers (NAAMM) “Metal Finishes Manual” for finish designations and application recommendations to match sheet finish specified above, except where more stringent requirements are indicated.

B. Finish all joints, bends, abrasions, and other surface blemishes to match the sheet finish. Finish free of tool or construction marks, or dents.

C. Protect mechanical finishes on exposed surfaces from damage by application of removable temporary protective covering prior to shipment.

D. Stainless Steel Handrails

1. Finish: Brushed longitudinally

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that the surfaces to receive steel are properly prepared. Do not start work until conditions are satisfactory.

3.02 PREPARATION

A. Coordinate and furnish anchorages and setting drawings, diagrams, templates, instructions and directions for installation of items having integral anchors that are to be installed by others. Coordinate delivery of such items to construction site.

B. Protect mounting surfaces and adjacent areas against damage and discoloration caused by work in this section.

3.03 INSTALLATION

A. General: Locate unit and accessories where shown, using mounting methods of the type described and in compliance with the manufacturer's instructions. Install units level, plumb and at the height indicated, with surfaces free from distortion or other defects in appearance.

3.04 PROTECTION

A. Protect finishes from damage during construction period by use of temporary protective coverings. Remove protective covering at time of substantial completion. Protect adjacent surfaces from damage during field fabrication and installation.

B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units as required.

3.05 CLEANING

A. Clean all exposed surfaces just prior to date of substantial completion in accord with manufacturer's written cleaning instructions. Protect units from damage until acceptance.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 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.

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

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 2022.

D. PS 1 - Structural Plywood 2009 (Revised 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.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

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.

1.04 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

2.01 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.

2.02 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.

2.03 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.

2.04 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.

2.05 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.

2.06 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

3.01 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.

3.02 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.

3.03 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.

3.04 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.

3.05 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.06 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.

3.07 CLEANING

A. Waste Disposal: See Section 01 74 19 - 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 06 10 00

SECTION 06 18 00
GLUED-LAMINATED CONSTRUCTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glue laminated wood beams and purlins.

B. Preservative treatment of wood.

1.02 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 2016a.

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 2022.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

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.

1.04 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.

1.05 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

2.01 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 01 60 00 - Product Requirements.

2.02 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.

2.03 MATERIALS

A. Laminating Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.

2.04 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 01 60 00 - 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.

2.05 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.

G. Field Finishing of Members: Specified in Section 09 91 13 and 09 91 23.

PART 3 EXECUTION

3.01 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.

E. Field Finishing: Specified in Section 09 91 13 and 09 91 23.

3.02 TOLERANCES

A. Framing Members: 1/2 inch (12 mm) maximum from true position.

END OF SECTION 06 18 00

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water-resistive barriers.

1.02 RELATED REQUIREMENTS

A. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

1.03 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.

1.04 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 2023.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.

E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on material characteristics.

C. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.06 MOCK-UPS

A. See Section 01 40 00 - 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 opening and corner conditions.

C. Mock-up may remain as part of work.

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.01 WATER-RESISTIVE BARRIER MATERIALS

A. 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. Water Resistance: Withstand hydrostatic head of 111 inches (282 cm), minimum, for at least five hours; pass test method in accordance with AATCC Test Method 127.
6. Seam and Perimeter Tape: As recommended by sheet manufacturer.
7. Products:
   a. DuPont de Nemours, Inc.; Tyvek Commercial Wrap.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 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. DuPont de Nemours, Inc; FlexWrap: www.dupont.com/building/#sle.
      b. DuPont de Nemours, Inc; StraightFlash: www.dupont.com/building/#sle.
      c. DuPont de Nemours, Inc; VersaFlange: www.dupont.com/building/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions comply with requirements of this section.

3.02 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.

3.03 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. Attach to masonry construction using mechanical fasteners spaced at 12 to 18 inches (305 to 460 mm) vertically on center, and at 24 inches (610 mm), maximum, horizontally on center.
   6. 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.
   7. 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.
   8. Install water-resistive barrier over jamb flashings.
   9. Install head flashings under water-resistive barrier.
   10. 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.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 07 25 00

SECTION 07 42 13
METAL ROOF AND WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured metal panels for with related flashings and accessory components.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wall panel substrate.

B. Section 07 92 00 - Joint Sealants: Sealing joints between metal panel system and adjacent construction.

1.03 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. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.

C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process 2021a.

E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.

F. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components 2023.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: 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 panels, 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 assembly.

F. Manufacturer's qualification statement.

G. Installer's qualification statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in installing products specified in this section with minimum three years of documented experience.

1.06 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Construct mock-up, 10 feet (3.05 m) long by 10 feet (3.05 m) wide; include panel system, attachments to building frame, associated vapor retarder and air seal materials, weep drainage system, sealants and seals and roof underlayment.

C. Mock-up may remain as part of work.

1.07 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.

1.08 FIELD CONDITIONS

A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. 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.

C. Special Warranty: Provide 2-year warranty covering water tightness and integrity of seals of metal panels. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Panel Basis of Design Product - Concealed Fastener:
   1. Phoenix; Composite Wall Panels, EVO Panels; https://www.phoenixpanels.net/.

B. Other Metal Panel Manufacturers:
   1. ATAS International, Inc; Wind-Lok Soffit MPS 120: www.atas.com/#sle.
   2. Berridge Manufacturing Company: www.berridge.com/#sle.
   3. McElroy Metal: www.mcelroymetal.com/#sle.
   4. Metal Roofing Systems, Inc: www.metalroofingsystems.biz/#sle.
   5. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
   6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 METAL WALL PANEL SYSTEM

A. Panel System: Factory fabricated prefinished metal panel system, site assembled.
   1. 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 panels.
   2. Design Pressure: In accordance with applicable codes.
   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.

B. Exterior Panels:
   1. Profile: Vertical; style as indicated.
   2. Side Seams: Wet sealed with backer rod and sealant.
   3. Material: Precoated aluminum sheet, 20 gauge, 0.032 inch (0.81 mm) minimum thickness.
   4. Panel Width: 24".
   5. Color: Brushed aluminum.

C. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

D. Anchors: Galvanized steel or Stainless steel.

2.03 MATERIALS

A. Precoated Aluminum Sheet: ASTM B209/B209M, 3105 alloy, O temper, with smooth surface texture; 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.

2.04 ACCESSORIES

A. Aluminum Cladding Support System: Thermally isolated from substrate with vertical face fastening. Comply with ASHRAE Std 90.1 I-P and NFPA 285.
   1. Substrate: As indicated on drawings.
   2. Brackets: Extruded aluminum, with thermal spacer at base and slot at top to allow field adjustment and alignment of rails.
      a. Range of Height Adjustment: As indicated on drawings.
   3. Vertical Rail: Cladding support, extruded aluminum with 0.094-inch (2.4 mm) minimum thickness, and 118-1/8 inches (3000 mm) long; attached to bracket.
   4. Horizontal Rail: Cladding support, extruded aluminum with 0.094-inch (2.4 mm) minimum thickness and unique profile, 118-1/8 inches (3000 mm) long; attached to vertical rail.
   5. Fasteners: Provide support system and cladding attachment fasteners as recommended by system manufacturer in accordance with requirements.

B. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.
   1. Type: Woven polypropylene with anti-slip polyolefin coating on both sides.
      a. Products:
         1) Certainteed Roofing; DiamondDeck Underlayment: www.certainteed.com/#sle.
         2) Substitutions: See Section01 60 00-Product Requirements.

C. Concealed Sealants: Non-curing butyl sealant or tape sealant, see Section 07 92 00

D. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.

E. Fasteners: Manufacturer's standard type to suit application; stainless steel.
   1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.

F. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building framing members are ready to receive panels.

3.02 PREPARATION

A. Protect surrounding areas and adjacent surfaces from damage during execution of this work.

3.03 INSTALLATION

A. Install panels 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 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.

3.04 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.

3.05 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Remove site cuttings from finish surfaces.

C. Remove protective material from panel surfaces.

D. Upon completion of installation, thoroughly clean prefinished aluminum surfaces in accordance with AAMA 609 & 610.

3.06 PROTECTION

A. Protect metal wall panels until completion of project.

B. Touch-up, repair, or replace damaged wall panels or accessories before Date of Substantial Completion.

END OF SECTION 07 42 13

SECTION 07 42 33
EXTERIOR SOLID PHENOLIC WALL PANELS

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.02 SECTION INCLUDES

A. The Work of this Section includes all labor, materials, equipment, and services necessary to complete the solid phenolic rainscreen panels and accessories as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:
   1. High-pressure laminate panels with solid phenolic polyurethane resin faces used at walls and soffits.
   2. Supporting substructure which is part of the rainscreen system design.
   3. Accessories, including anchors and attachments.

1.03 RELATED SECTIONS

A. Rough Carpentry – Section 061000 for in wall blocking as needed.

B. Weather Barrier - Section 072500.

1.04 SYSTEM DESCRIPTION

A. Exterior Rainscreen Assembly: Solid phenolic core, fire retardant exterior grade rainscreen wall panels, aluminum substructure, attachment system components, air/vapor barrier membrane, continuous exterior insulation, and all accessories necessary for a complete rear-ventilated, weathertight exterior rainscreen wall system. Furnish fastenings and flashings as required to complete rainscreen system.

1.05 PERFORMANCE CRITERIA

A. Performance Requirements: Provide panels that have been manufactured, fabricated and installed to maintain performance criteria stated by manufacturer, without defects, damage or failure.

B. Structural Design: Design calculations certified by a registered professional engineer licensed in the State of Oregon shall be submitted to verify load carrying capability of panel system using performance requirements and design criteria as indicated. Panel system shall be capable of resisting a minimum positive and negative wind load per ASCE-7 or building code, whichever is greater.

C. Deflection Limits: Aluminum support structure and exterior phenolic rainscreen panel system shall be designed in accordance with the Manufacturer's recommended maximum deflection when tested under positive and negative design wind gust loads and shall withstand wind gust loads with horizontal deflections no greater than the Manufacturer's allowable span, based on current wind load tables.

D. Thermal Movements: Exterior solid phenolic rainscreen panel system shall allow for thermal movements from ambient air, surface temperature changes and relative humidity preventing buckling, opening of joints, over-stressing of components, failure of connections and other detrimental effects. Base calculations on surface temperature changes of materials due to both solar heat gain and nighttime sky heat loss.
   1. Panel shall remain stable for temperature Change (Range): -112 deg. F, ambient: 356 deg. F, material surfaces.

E. Support Structure: Provide aluminum support structure capable of the following:
   1. Design and install aluminum support structure to accommodate expected construction tolerances and misalignment, deflection of building structural components, and openings in the building enclosure as designed.

1.06 SUBMITTALS

A. Product Data: For each type of product indicated. Include Manufacturer's written installation instructions, including recommendations for evaluating, preparing, and treating substrate, rainscreen panel technical data, material descriptions, and finishes and tested physical and performance properties.

B. Shop Drawings: Show fabrication and installation layouts of solid phenolic exterior rainscreen panel, details of aluminum support structure attachment and wall structure conditions, anchorages for aluminum support structure, attachment system for panels, allowances for thermal expansion, trim, closures, flashings, corner conditions, and accessories as required or specified by the architect, and all special job specific details.

C. Samples: Submit selection and verification samples for finishes, colors and textures of panel material. Final color selections will be pending review and approval of full scale mock-up. For exposed fastening systems submit color matched exterior stainless steel Torx head fasteners for each color specified. If riveted fastening is selected by architect provide color matched rivets for each panel color specified.

D. Quality Assurance: Submit the following:
   1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties.
      a. Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
   2. Manufacturer's Instructions: Manufacturer's installation instructions.
   3. Manufacturer's Field Reports: Manufacturer's field reports specified herein.

E. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data: Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
   2. Warranty: Warranty documents specified herein.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall be approved by the manufacturer and have a minimum of five (5) years of experience in performing work of similar type and scope.

B. Fabricator Qualifications: A shop that employs skilled workers who custom fabricate solid phenolic or similar exterior rainscreen wall panel systems to those specified herein and is approved by the manufacturer. If shop drawings are required for the project the shop drawings are to be drawn and coordinated by the approved fabrication company.

C. Pre-Installation Conference: Conduct pre-installation conference at Project site prior to commencing construction of mock-up specified herein to verify Project requirements.
   1. Review solid phenolic rainscreen panel installation requirements including substrate surface preparation, environmental or site limitations, typical details including attachment and trims, Manufacturer's recommended installation procedures, coordination with adjacent trades, testing and inspection procedures (if any), protection of work and repair procedures.
   2. Ensure all sub-trades interfacing with or affected by the construction of the solid phenolic rainscreen wall panel system are present, including Architect, General Contractor, solid phenolic panel Manufacturers Representative, mockup and commissioning testing agencies, air barrier installation contractor, exterior insulation installer, electrical installer and any other installer whose work interfaces with or affects the solid phenolic rainscreen wall panels.

D. Source Limitations: Obtain solid phenolic rainscreen wall panels and all auxiliary materials from a single source Manufacturer who has a minimum of 25 years of experience in the manufacturing of exterior high pressure phenolic rainscreen panels or an accessory Manufacturer who is certified by the solid phenolic rainscreen panel Manufacturer. Panels to be manufactured by a Manufacturer with ISO9001 and ISO14001 certification of standards.

1.08 MOCK UP

A. Before construction of the exterior rainscreen envelope, construct a mock-up showing panel pattern with representative colors and sizes to verify selections made under approved submittals and to demonstrate typical joints, surface finish, texture, tolerances, attachments to building structure, methods of installation, connections to adjacent building enclosure materials, and standard and quality of workmanship. Build mock-up to comply with the following requirements using materials indicated for completion of the Work:
   1. Mock-up shall be a minimum of 100 square feet and shall demonstrate substrate surface preparation, air barrier membrane joint and crack treatment, solid phenolic rainscreen

panel attachment, penetration sealing, connection to window and other adjacent building envelope materials, attachment method to wall substrate, and standard of workmanship.

2. Demonstrate continuity, air, and water tightness of air and water barrier and installation and attachment of continuous exterior insulation.
3. If Architect determines that the field constructed mock-up does not meet Project requirements, reinstall mock-up until approved.
4. Retain and maintain the approved field mockup during construction in an undisturbed condition as a standard for judging the completed exterior solid phenolic rainscreen panel system. At the architect's discretion, the mock-up may be part of the completed Work.

1.09 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer. Comply with manufacturer's written handling and storage guidelines.

1.10 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.11 WARRANTY

A. Submit Manufacturer's standard 10 year limited warranty covering defects in material or manufacturing quality, including color fastness warranty. Warranty to include labor for removal, replacement and reinstallation of defective material.

B. Warranty is only available when solid phenolic rainscreen panels are installed and fabricated by an installation contractor that has been approved by the Manufacturer and has followed the recommended guidelines of the Manufacturer, and has been signed and dated by the appropriate parties listed on the warranty registration form.

PART 2 PRODUCTS

2.01 SOLID PHENOLIC WALL PANELS

A. Basis of Design: Provide "Max Compact Exterior F-Quality" panels as manufactured by FunderMax GmBH / FunderMax North America, 9401-P Southern Pine Blvd, Charlotte NC 28273. A list of local fabricators or installers that comply with this specification section may be requested from the above.

1. Material: Fire-retardant solid phenolic panels with standard brown core comprised of kraft paper harvested from FSC certified forests and thermosetting resins. Dry Formed (DF) or Natural Fiber Core (NFC) products will not be accepted.
   a. Rainscreen Panel Surface: NT
   b. Modulus of Elasticity: 1,300,000-psi minimum.
   c. Weight: 8mm 2.4 lbs./SF; 10mm, 3 lbs./SF; 12mm, 3.9 lbs./SF
   d. Tensile Strength: 11,000-PSI, minimum.
   e. Flexural Strength: 13,000-PSI, minimum.
   f. Surface Impact Resistance: < 8 per EN ISO 178
   g. Scratch Resistance: > 3 /4 N per EN 438:6
   h. Optical Properties: Color Stability Gray Scale > 4 per ISO 4892-2, EN 20105-A02.
   i. Panels shall be hail impact resistant with no breakage per Austrian APBIC Standard, Association of Public Building Insurance Companies. Equivalent test standard 70mm ice ball at a velocity of 30 meters/second (67.10 mph) without breakage, tearing or discoloration.
   j. Panels shall be FSC Certified
   k. Panels shall have an Environmental Product Declaration (EPD) Report.
   l. Panels shall have a Health Product Declaration (HPD)
2. Colors: Submit manufacturer's standard colors for selection by Architect and or individual Décor option.
   a. As selected by Architect from Manufacturer's standard color range and shown on drawings.
3. Finish: NT

4. Panel Core: Brown
5. Rainscreen Panel Thickness: 12mm

B. Panel Tolerance:
1. Thickness: 1/32”, maximum.
2. Length: ¼”, maximum.
3. Width: ¼”, maximum.
4. Non-porous homogenous surface and edges which do not require sealing after cutting or drilling.

2.02 SUPPORT STRUCTURE

A. Support systems
1. Exposed Fastening Type using extruded aluminum profiles, clips, closures, fasteners and Tees as indicated on the architectural drawings.
a. Extruded 6063T5 or 6063T6 Alloy Aluminum which may be mill finish or painted, or powder coated black for the type of use indicated on the project Drawings.
b. Fasteners: SFS TWS D13 screws or SFS AP 16 rivets, color matched, as indicated on the architectural drawings.
2. Concealed Bracket and Rail Components using extruded aluminum profiles, clips, closures and Tees as indicated on the architectural drawings.
a. Made from 6063T5 or 6063T6 Alloy Aluminum.
b. Concealed items to be mill finish, exposed items to be in exposed areas.
c. Brackets to be adjustable for out of plumb conditions.
3. Provide aluminium support system for rainscreen cladding attachment at horizontals using the X-Z19PF profile by XKELEX as necessary.

2.03 SOURCE QUALITY CONTROL

A. Panels shall be specifically designed for exterior rainscreen wall applications. Fabricated panels shall comply with all current codes and regulations for the Project. Panels shall have uniform thickness (+0.03”) and flatness (maximum difference of 0.03”) for a 10 foot span.

B. Flame Spread: Panels to conform to ASTM E-84 for Class A fire rating with a Flame spread index of less than 10 and Smoke development index of less than 450.

C. NFPA-268 Surface Ignition test, pass.

D. Ignition Temperature: Greater than 650 degrees Fahrenheit above ambient, ASTM D-1929

E. UV stable surface of Acrylic-PUR resin coating of 100 micron thickness or greater with color stability > 4 on Gray Scale.

F. When required by code, the assembly shall meet the performance requirements of NFPA 285. Exposed fastening assemblies listed in ICC ESR #3340 or Concealed fastening assemblies with Engineering Evaluation report(s) from a nationally recognized fire protection consulting firm. Any variations must be approved by the local code official.

2.04 FABRICATION

A. Fabricate solid phenolic wall panels and accessory items in accordance with manufacturer's written recommendations and approved submittals.

B. Fabricate panels with a minimum of 1mm micro bevel on the exposed face.

C. Comply with indicated profiles and within dimensional and structural requirements. Fabricator shop drawings to comply with manufacturer’s written guidelines for ventilation of the rainscreen façade.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer’s product data, including product technical bulletins, product installation instructions and published technical guidelines.

3.02 EXAMINATION

A. Site Verification of Conditions: Verify that substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

B. Verify that air and weather resistant barrier has been installed over structural sheathing in accordance with air barrier Manufacturer's recommended installation instructions and terminated properly at openings to prevent air infiltration or water penetration.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION

A. Install wall panels plumb and level and accurately spaced in accordance with manufacturer's recommendations and approved submittals and Shop Drawings.

B. Fasten solid phenolic wall panels to supporting aluminum substructure with fasteners approved for use by solid phenolic rainscreen manufacturer for use with adjoining construction and in accordance with approved Shop Drawings.

C. Accessory Items: Install corner profiles, gaskets and trim with fasteners and adhesive appropriate for use with adjoining construction as indicated on approved Shop Drawings and as recommended by manufacturer.

D. Do not apply sealant to solid phenolic rainscreen panel joinery unless otherwise indicated on approved Shop Drawings or in accordance with the Manufacturer's recommended installation instructions.

3.04 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of off site.

3.05 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION 07 42 33

SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adhered system with thermoplastic polyolefin (TPO) roofing membrane.

B. Deck sheathing.

C. Roofing cant strips and walkway pads.

1.02 RELATED REQUIREMENTS

A. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings, reglets.

1.03 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 C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2022a.

C. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing 2021.

D. NRCA (RM) - The NRCA Roofing Manual 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.
   1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's written information listed below.
   1. Product data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements.

C. Shop Drawings: Indicate joint or termination detail conditions and conditions of interface with other materials.

D. Samples for Selection: Submit two samples 12 by 12 inches (305 by 305 mm) in size illustrating color.

E. Samples for Verification: Submit two samples 12 by 12 inches (305 by 305 mm) in size illustrating color.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.

H. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.

I. Specimen Warranty: For approval.

J. Warranty:
   1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
   2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.

K. Manufacturer's Qualification Statement.

L. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty (20) years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section:
   1. With minimum five (5) years documented experience.
   2. Approved by membrane manufacturer.

1.07 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Provide mock-up for evaluation of surface preparation, installation methods, and workmanship. mock-up.

C. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Protect products in weather protected environment, clear of ground and moisture.

C. Protect foam insulation from direct exposure to sunlight.

D. Provide Safety Data Sheets (SDS) at the project site at all times during transportation, storage, and installation of materials.

E. Comply with requirements from Owner to prevent overloading or disturbance of the structure when loading materials onto the roof.

1.09 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather. Refer to manufacturer's written instructions.

B. Do not apply roofing membrane when ambient temperature is below 40 degrees F (5 degrees C) or above 80 degrees F (27 degrees C).

C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

E. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.

F. Do not allow grease, oil, fats, or other contaminants to come into direct contact with membrane.

1.10 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Material Warranty: Provide membrane manufacturer's warranty agreeing to replace material that shows manufacturing defects within 10 years after installation.

C. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
   1. Warranty Term: 20 years.
   2. For repair and replacement include costs of both material and labor in warranty.
   3. Include accidental punctures according to the manufacturer's standard warranty terms.
   4. Include hail damage according to the manufacturer's standard warranty terms.
   5. Exceptions NOT Permitted:
      a. Damage due to roof traffic.
      b. Damage due to wind of speed greater than 56 mph (90 km/h) but less than 90 mph (145 km/h).

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Carlisle SynTec Systems: www.carlisle-syntec.com/#sle.

B. Firestone Building Products: www.firestonebpe.com/#sle.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ROOFING APPLICATIONS

A. TPO Membrane Roofing: One ply membrane, fully adhered, over vapor retarder and insulation.

B. Roofing Assembly Performance Requirements and Design Criteria:
   1. Wind Uplift:
      a. Designed to withstand wind uplift forces calculated with ASCE 7.
      b. Design Wind Speed: In accordance with local building code and authorities having jurisdiction (AHJ).
   2. Insulation Thermal Resistance (R-Value): Provide R-Value over entire roof deck in accordance with local building code requirements and as noted on drawings.
   3. Drainage: No standing water within 48 hours after precipitation.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

A. Single Source Responsibility: Provide and install products from single source.

B. Membrane:
   1. Material: Thermoplastic Polyolefin (TPO) complying with ASTM D6878/D6878M.
   2. Reinforcing: Internal fabric.
   3. Thickness: 60 mils (0.060 inch) (1.5 mm), minimum.
   4. Sheet Width: Factory fabricated into largest sheets possible.
   5. Color: Gray.
   6. Products:
      a. Carlisle Sure-Weld FleeceBACK TPO.
      b. Firestone Building Products; UltraPly TPO XR Fleeceback.

C. Seaming Materials: As recommended by membrane manufacturer.

D. Vapor Retarder: Material approved by roof manufacturer complying with requirements of fire rating classification; compatible with roofing and insulation materials.
   1. Fire-retardant adhesive.

E. Flexible Flashing Material: Same material as membrane.

F. Base Flashing: Provide waterproof, fully adhered base flashing system at all penetrations, plane transitions, and terminations.

2.04 DECK SHEATHING AND COVER BOARDS

A. Deck Sheathing and Cover Board: See Drawings

2.05 INSULATION

A. Polyisocyanurate (ISO) Board Insulation: Complies with ASTM C1289, Type II, Class 1 - Faced with glass-reinforced felt on both surfaces of core foam.
   1. Grade and Compressive Strength: Grade 3, 25 psi (Grade 3, 172 kPa), minimum.
   2. Board Thickness: Minimum 1/2 inch (12.7 mm).
   3. Products:
      a. Carlisle InsulBase.
      b. Firestone ISO 95+ GL.

2.06 ACCESSORIES

A. Prefabricated Flashing Accessories:
   1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
   2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
   3. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.
   4. Pressure Sensitive Cover Strips: 6 inches (152 mm) wide, 45 mil, 0.045 inch (1.1 mm) thick, non-reinforced TPO membrane laminated to 35 mil, 0.035 inch (0.9 mm) thick cured synthetic rubber with pressure sensitive adhesive.
   5. Pressure Sensitive Cover Strips: 6 inches (152 mm) wide, 45 mil, 0.045 inch (1.1 mm) thick, non-reinforced TPO membrane laminated to 35 mil, 0.035 inch (0.9 mm) thick cured synthetic rubber with pressure sensitive adhesive.

6. Miscellaneous Flashing: Non-reinforced TPO membrane; 80 mil, 0.080 inch (2.0 mm) thick, in manufacturer's standard lengths and widths.

B. Insulation Adhesive: Two-component polyurethane, expanding foam.

C. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches (150 mm) wide; self adhering.

D. Membrane Adhesive: As recommended by membrane manufacturer.

E. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

F. Sealants: As recommended by membrane manufacturer.

G. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.

H. Primer: Manufacturer's recommended product.

I. Edgings and Terminations: Manufacturer's standard edge and termination accessories.
   1. Snap-On Edge System:
   2. Anchor Bar Fascia System:
   3. Drip Edge System:
   4. Coping System:
   5. TPO Coated Sheet Metal.
   6. Termination Bar.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION, GENERAL

A. Clean substrate thoroughly prior to roof application.

B. Do not begin work until other work that requires foot or equipment traffic on roof is complete.

C. Apply manufacturer's recommended vapor retarder or temporary roof before roof installation.

3.03 WOOD DECK PREPARATION

A. Verify flatness and tightness of joints of wood decking. Verify that all wood decking edges are fully supported. Fill knot holes with latex filler or completely cover with securely nailed sheet metal.

B. Confirm dry deck by moisture meter with 12 percent moisture maximum.

3.04 INSTALLATION - GENERAL

A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

F. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

G. When substrate preparation is responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.

3.05 DECK SHEATHING INSTALLATION

A. Install deck sheathing per roof membrane manufacturer's requirements.

B. Install deck sheathing to meet code wind requirements for location of project.

3.06 VAPOR RETARDER AND INSULATION APPLICATION

A. Apply vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.
   1. Extend vapor retarder under cant strips and blocking to deck edge.
   2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.

B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.

C. Attachment of Insulation: Embed insulation in adhesive in full contact, in accordance with roofing and insulation manufacturers' instructions.

D. Do not install wet, damaged, or warped insulation boards.

E. Lay subsequent layers of insulation with joints staggered minimum 6 inch (152 mm) from joints of preceding layer.

F. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

G. Lay boards with edges in moderate contact without forcing, and gap between boards no greater than 1/4 inch (6.3 mm). Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

H. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

I. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches (450 mm).

J. Do not apply more insulation than can be completely waterproofed in the same day.

3.07 MEMBRANE APPLICATION

A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.

B. Shingle joints on sloped substrate in direction of drainage.

C. Fully Adhered Application: Apply adhesive at manufacturer's recommended rate. Fully embed membrane in adhesive except in areas directly over or within 3 inches (75 mm) of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.

D. Seam Welding:
   1. Seam Welding: Overlap edges and ends and seal seams by heat welding, minimum 2 inches (51 mm).
   2. Cover seams with manufacturer's recommended joint covers.
   3. Probe seams once welds have thoroughly cooled, in approximately 30 minutes.
   4. Repair deficient seams within the same day.
   5. Seal cut edges of reinforced membrane after seam probe is complete.

E. At intersections with vertical surfaces:
   1. Extend membrane over cant strips and up a minimum of 4 inches (100 mm) onto vertical surfaces.
   2. Fully adhere flexible flashing over membrane and up to nailing strips.
   3. Secure flashing to nailing strips at 4 inches (100 mm) on center.
   4. Insert flashing into reglets and secure.

F. At gravel stops, extend membrane under gravel stop and to the outside face of the wall.

G. Install roofing expansion joints where indicated. Make joints watertight.

H. Install prefabricated joint components in accordance with manufacturer's instructions.

I. Coordinate installation of roof drains and sumps and related flashings. Locate all field splices away from low areas and roof drains. Lap upslope sheet over downslope sheet.

J. Install walkway pads at areas of concentrated traffic and as shown on Drawings. Space pad joints to permit drainage.

K. Daily Seal: Install daily seal per manufacturers instructions at the end of each work day. Prevent infiltration of water at incomplete flashings, terminations, and at unfinished membrane edges.

3.08 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for general requirements for field quality control and inspection.

B. Require site attendance of roofing material manufacturers daily during installation of the Work.

3.09 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Remove wrappings, empty containers, paper, and other debris from the roof daily. Dispose of debris in compliance with local, State, and Federal regulations.

C. Remove bituminous markings from finished surfaces.

D. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

E. Repair or replace defaced or damaged finishes caused by work of this section.

3.10 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07 54 23

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, and exterior penetrations.

B. Sealants for joints within sheet metal fabrications.

1.02 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 2020.

C. ASTM B32 - Standard Specification for Solder Metal 2020.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

E. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing 2015a (Reapproved 2021).

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).

G. CDA A4050 - Copper in Architecture - Handbook current edition.

H. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

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.

1.05 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.

1.06 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

2.01 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 01 60 00 - Product Requirements.

B. Exterior Penetration Flashing Panel:
   1. Quickflash Weatherproofing Products, Inc: www.quickflashproducts.com/#sle.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SHEET MATERIALS

A. 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. Colors: As selected by Architect from manufacturer's full colors.

2.03 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.

2.04 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.

2.05 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

3.01 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.

3.02 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).

3.03 INSTALLATION

A. Comply with drawing details.

B. Insert flashings into reglets to form tight fit; secure in place with lead wedges; pack remaining spaces with lead wool; seal flashings into reglets with sealant.

C. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

D. Apply plastic cement compound between metal flashings and felt flashings.

E. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

F. Exterior Flashing Receivers: Install in accordance with manufacturer's recommendations, and in proper relationship with adjacent construction, and as follows:
   1. Secure receiver at perimeter of wall opening with adhesives or fasteners.
   2. Place flashing into receiver channel.
   3. Secure flashing with receiver clip.

G. Seal metal joints watertight.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION 07 62 00

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 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.

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.

F. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2022.

G. ASTM C1311 - Standard Specification for Solvent Release Sealants 2022.

H. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.

I. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).

J. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016 (Reapproved 2021).

K. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2017).

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

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. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   7. Sample product warranty.
   8. 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. Installer's qualification statement.

G. Executed warranty.

1.04 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.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. 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.

C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 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 01 60 00 - 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 01 60 00 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
      a. Wall expansion and control joints.
      b. Joints between door, window, and other frames and adjacent construction.
      c. Joints between different exposed materials.
      d. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Other joints indicated below.
   3. Do not seal the following types of joints:
      a. Intentional weep holes in masonry.
      b. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
      c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      d. Joints where installation of sealant is specified in another section.

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. 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, Ceiling, and Floor Joints Where Tamper-Resistance is Required: Non-sag tamper-resistant silyl-terminated polyurethane sealant.
3. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
4. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.04 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 756 SMS Building Sealant: www.dow.com/#sle.
      b. Dow; DOWSIL 790 Silicone Building Sealant: www.dow.com/#sle.
      c. Dow; DOWSIL 791 Silicone Weatherproofing Sealant: www.dow.com/#sle.
      d. Dow; DOWSIL 795 Silicone Building Sealant: www.dow.com/#sle.
      e. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
      f. Pecora Corporation; Pecora 864 NST (Non-Staining Technology): www.pecora.com/#sle.
      g. Sika Corporation; Sikasil WS-290: www.usa.sika.com/#sle.
      h. Sika Corporation; Sikasil WS-295: www.usa.sika.com/#sle.
      i. Sika Corporation; Sikasil 728NS: www.usa.sika.com/#sle.
      j. Tremco Commercial Sealants & Waterproofing; Spectrem 1: www.tremcosealants.com/#sle.
      k. Tremco Commercial Sealants & Waterproofing; Spectrem 2: www.tremcosealants.com/#sle.
      l. Tremco Commercial Sealants & Waterproofing; Spectrem 3: www.tremcosealants.com/#sle.
      m. Tremco Commercial Sealants & Waterproofing; Spectrem 4-TS: www.tremcosealants.com/#sle.
      n. Tremco Commercial Sealants & Waterproofing; Tremsil 200: www.tremcosealants.com/#sle.
      o. Tremco Commercial Sealants & Waterproofing; Tremsil 400: www.tremcosealants.com/#sle.
      p. Substitutions: See Section 01 60 00 - 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 01 60 00 - 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. Color: Match adjacent finished surfaces.
   2. Service Temperature Range: Minus 40 to 180 degrees F (Minus 40 to 82 degrees C).
   3. Products:
      a. Pecora Corporation; DynaTrol II: www.pecora.com/#sle.
      b. Pecora Corporation; DynaFlex: www.pecora.com/#sle.

c. Sika Corporation; Sikaflex-1a: www.usa.sika.com/#sle.
d. Sika Corporation; Sikaflex-15 LM: www.usa.sika.com/#sle.
e. Sika Corporation; Sikaflex-2c NS: www.usa.sika.com/#sle.
f. Tremco Commercial Sealants & Waterproofing; Dymonic 100: www.tremcosealants.com/#sle.
g. Tremco Commercial Sealants & Waterproofing; Dymeric 240 FC: www.tremcosealants.com/#sle.
h. Tremco Commercial Sealants & Waterproofing; Vulkem 116: www.tremcosealants.com/#sle.
i. Substitutions: See Section 01 60 00 - 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. Tremco Commercial Sealants & Waterproofing; Tremstop Smoke and Sound: www.tremcosealants.com/#sle.
c. Tremco Commercial Sealants & Waterproofing; Tremstop Smoke and Sound Spray: www.tremcosealants.com/#sle.
d. Substitutions: See Section 01 60 00 - 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.

2.05 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. Dow; DOWSIL FC Parking Structure Sealant: www.dow.com/#sle.
c. Pecora Corporation; Pecora 300 SL (Self-Leveling): www.pecora.com/#sle.
d. Sika Corporation; Sikasil 728RCS: www.usa.sika.com/#sle.
e. Tremco Commercial Sealants & Waterproofing; Spectrem 900SL: www.tremcosealants.com/#sle.
f. Substitutions: See Section 01 60 00 - 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. Pecora Corporation; _____: www.pecora.com/#sle.
b. Sika Corporation; Sikaflex-1c SL: www.usa.sika.com/#sle.
c. Sika Corporation; Sikaflex-2c SL: www.usa.sika.com/#sle.
d. Substitutions: See Section 01 60 00 - 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. Pecora Corporation; Urexpan NR-200: www.pecora.com/#sle.
   c. Tremco Commercial Sealants & Waterproofing; THC-901: www.tremcosealants.com/#sle.
   d. Substitutions: See Section 01 60 00 - Product Requirements.

D. Flexible Polyurethane Foam: Single-component, gun grade, and low-expanding.
1. Color: White.
2. Products:
   a. Tremco Commercial Sealants & Waterproofing; ExoAir Flex Foam: www.tremcosealants.com/#sle.
   b. Tremco Commercial Sealants & Waterproofing; ExoAir LEF: www.tremcosealants.com/#sle.
   c. Substitutions: See Section 01 60 00 - 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 01 60 00 - Product Requirements.

F. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Composition: Multicomponent, 100 percent solids by weight.
2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
3. Color: To be selected by Architect from manufacturer's standard colors.
4. Joint Width, Minimum: 1/8 inch (3 mm).
5. Joint Depth: Provide product suitable for joints from 1/8 inch (3 mm) to 2 inches (51 mm) in depth including space for backer rod.
6. Products:
   a. Euclid Chemical Company; EUCO 700: www.euclidchemical.com/#sle.
   b. W.R. Meadows, Inc; Rezi-Weld Flex: www.wrmeadows.com/#sle.
   c. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
3. Open Cell: 40 to 50 percent larger in diameter than joint width.
4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
5. Products:
   a. Adfast USA Inc; Adseal BR-2600 Backer Rod: www.adfastcorp.com/#sle.
   b. Substitutions: See Section 01 60 00 - Product Requirements.

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

3.01 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.

3.02 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.

3.03 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.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - 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.

3.05 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 07 92 00

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Thermally insulated hollow metal doors with frames.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 09 90 00 - Painting and Coating

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. HMMA: Hollow Metal Manufacturers Association.

C. NAAMM: National Association of Architectural Metal Manufacturers.

D. NFPA: National Fire Protection Association.

E. SDI: Steel Door Institute.

F. UL: Underwriters Laboratories.

1.04 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 2018.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2020.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

F. 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.

G. 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 2018a.

H. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

J. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.

K. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.

L. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.

M. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.

N. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.

O. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2019.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

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.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than 10 years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Maintain at project site copies of reference standards relating to installation of products specified.

1.07 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

2.01 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 01 60 00 - Product Requirements.

2.02 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. Hollow Metal Panels: Same construction, performance, and finish as doors.

C. 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.

2.03 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.
   3. Door Thermal Resistance: R-Value of Drawings.
   4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
   5. Top Closures for Outswinging Doors: Flush with top of faces and edges.
   6. Weatherstripping: Refer to Section 08 71 00.

2.04 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 08 71 00.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

A. Louvers: Roll formed steel with overlapping frame; finish same as door components ; factory-installed.
   1. Style: Standard straight slat blade.
   2. Louver Free Area: 50 percent.
   3. Fasteners: Concealed fasteners.

B. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

C. 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.

D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 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.

3.02 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. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Install door hardware as specified in Section 08 71 00.

E. Comply with glazing installation requirements of Section 08 80 00.

F. Coordinate installation of electrical connections to electrical hardware items.

G. Touch up damaged factory finishes.

3.03 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.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 08 11 13

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for hollow metal doors.

B. Thresholds.

C. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealants for setting exterior door thresholds.

B. Section 08 11 13 - Hollow Metal Doors and Frames.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.

B. BHMA A156.1 - Standard for Butts and Hinges 2021.

C. BHMA A156.2 - Bored and Preassembled Locks and Latches 2017.

D. BHMA A156.4 - Door Controls - Closers 2019.

E. BHMA A156.7 - Template Hinge Dimensions 2016.

F. BHMA A156.16 - Auxiliary Hardware 2018.

G. BHMA A156.17 - Self Closing Hinges & Pivots 2019.

H. BHMA A156.21 - Thresholds 2019.

I. BHMA A156.22 - Standard for Gasketing 2021.

J. BHMA A156.26 - Standard for Continuous Hinges 2021.

K. BHMA A156.36 - Auxiliary Locks 2020.

L. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.

M. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

N. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.

O. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.

P. UL 437 - Standard for Key Locks Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

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. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

D. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1. Submit manufacturer's parts lists and templates.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. 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. Locksets and Cylinders: Three years, minimum.
   3. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 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. Auxiliary Hardware: BHMA A156.16.
   4. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.

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. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated.

2.02 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 01 60 00 - 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 power transfer hinges where electrified hardware is mounted in door leaf.
   10. 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.

2.03 CYLINDRICAL LOCKS

A. Manufacturers:
   1. Schlage, an Allegion brand: www.allegion.com/us/#sle.

B. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
   1. Bored Hole: 2-1/8 inch (54 mm) diameter.
   2. Latchbolt Throw: 1/2 inch (12.7 mm), minimum.
   3. Backset: 2-3/4 inch (70 mm) unless otherwise indicated.
   4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
      a. Finish: To match lock or latch.
   5. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.

2.04 AUXILIARY LOCKS (DEADLOCKS)

A. Manufacturers:
   1. Schlage, an Allegion brand: www.allegion.com/us/#sle.
   2. Substitutions: See Section 01 60 00 - 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.

2.05 CLOSERS

A. Manufacturers; Surface Mounted:
   1. Corbin Russwin, Norton, Rixson, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Falcon, an Allegion brand: www.allegion.com/us/#sle.
   3. LCN, an Allegion brand: www.allegion.com/us/#sle.
   4. Substitutions: See Section 01 60 00 - 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.

2.06 WALL STOPS

A. Manufacturers:
   1. Rockwood; an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Ives, an Allegion brand: www.allegion.com/us/#sle.
   3. Trimco: www.trimcohardware.com/#sle.
   4. Substitutions: See Section 01 60 00 - 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.

2.07 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 01 60 00 - 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.

2.08 WEATHERSTRIPPING AND GASKETING

A. Manufacturers:
   1. Pemko; an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Zero, an Allegion brand: www.allegion.com/us/#sle.
   3. Hager Companies: www.hagerco.com/#sle.
   4. National Guard Products, Inc: www.ngpinc.com/#sle.
   5. Substitutions: See Section 01 60 00 - 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, unless otherwise indicated.

2.09 FIRE DEPARTMENT LOCK BOX

A. Manufacturers:
   1. Knox Company; Knox-Box Rapid Entry System: www.knoxbox.com/#sle.
   2. Substitutions: See Section 01 60 00 - 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.

2.10 FINISHES

A. Finishes: Identified in Door Hardware Schedule.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 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 08 11 13.
   2. Mounting heights in compliance with ADA Standards:
      a. Locksets: 40-5/16 inch (1024 mm).
      b. Deadlocks (Deadbolts): 48 inch (1219 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 07 92 00 for additional requirements.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01 40 00 - 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.

3.04 ADJUSTING

A. Adjust work under provisions of Section 01 70 00 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.05 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.

3.06 PROTECTION

A. Protect finished Work under provisions of Section 01 70 00 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

3.07 DOOR HARDWARE SETS - SEE FOLLOWING PAGES

END OF SECTION 08 71 00

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glazing units.

B. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 07 25 00 - Weather Barriers.

B. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.

1.03 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 C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

D. ASTM C1036 - Standard Specification for Flat Glass 2021.

E. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.

F. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.

G. GANA (GM) - GANA Glazing Manual 2022.

H. GANA (SM) - GANA Sealant Manual 2008.

I. GANA (LGRM) - Laminated Glazing Reference Manual 2019.

J. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use 1990 (2016).

1.04 SUBMITTALS

A. Product Data on Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

C. Samples: Submit two samples 5 by 5 inch (127 by 127 mm) in size of glass units.

D. Manufacturer's qualification statement.

E. Installer's qualification statement.

F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 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 three years of documented experience.

1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.06 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Provide on-site glazing mock-up with the specified glazing components.

C. Mock-ups may remain as part of the Work.

1.07 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Etched Glass Manufacturers:
   1. GGI - General Glass International: www.generalglass.com/#sle.
   2. Walker Glass Company Ltd: www.walkerglass.com/#sle.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 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 07 25 00.

2.03 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. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.04 GLAZING UNITS

A. Type G1 - Etched Glass: Etched patterns on glass as full-coverage.
   1. Applications: Storage room high glazing.
   2. Glass Type: Monolithic.
   3. Thickness: 0.236 inch (6 mm), nominal.
   4. Pattern: Standard Etched Glass, 1-sided, exterior face.
   5. Sheet Size: As indicated on drawings
   6. Colored Glass: Gray.
   7. Glazing Method: Wet/dry glazing method, tape and sealant.
   8. Manufacturers:
      a. GGI - General Glass International; Satin Etched Glass: www.generalglass.com/#sle.
      b. Walker Glass Company Ltd; Walker Textures - Acid-Etched Glass:: www.walkerglass.com/#sle.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 GLAZING COMPOUNDS

A. Type GC-5 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; clear color.

2.06 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. Continuous 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 01 60 00 - 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

3.01 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.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry immediately 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.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch (610 mm) intervals, 1/4 inch (6 mm) below sight line.

F. Fill gaps between pane and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

3.05 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.

3.06 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 08 80 00

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Exterior painting and coating systems.

C. Scope:
   1. Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
      a. Exterior:
         1) Wood: Beams and trim.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Shop-primed items.

1.03 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).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

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 01 60 00 - 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.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

1.06 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for general requirements for mock-ups.

B. Provide 16 SF area of beams, roof framing and roof decking staining and sealing.

C. Locate as part of the final work.

D. Mock-up may remain as part of the work.

1.07 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.

1.08 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

2.01 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 01 60 00 - 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.

2.02 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.

2.03 PAINT SYSTEMS - EXTERIOR

A. Wood: Beams, framing, decking and trim.
   1. 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).

PART 3 EXECUTION

3.01 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.

3.02 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.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's written instructions.

B. Apply coatings at spread rate required to achieve manufacturer's recommended dry film thickness.

3.04 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.

3.05 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 90 00

SECTION 09 96 00
HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. High performance coatings.

B. Surface preparation.

1.02 RELATED REQUIREMENTS

A. Section 09 99 00 - Painting and Coating

1.03 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. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

D. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

F. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.

C. Samples: Submit two samples 8 by 8 inch (203 by 203 mm) in size illustrating colors available for selection.

D. Manufacturer's Certificate: Certify that high-performance coatings comply with VOC limits specified.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

G. Maintenance Data: Include cleaning procedures and repair and patching techniques.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Coating Materials: 1 gallon (4 liters) of each type and color.
   3. Label each container with manufacturer's name, product number, color number, and room names and numbers where used.

1.05 QUALITY ASSURANCE

A. Maintain one copy of each referenced document that applies to application on site.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum 7 years documented experience.

1.06 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for general requirements for mock-ups.

B. Provide mock-up of 100, 10 feet (3.1 m) long by 10 feet (3.1 m) wide, illustrating coating , for each specified coating.

C. Mock-up may remain as part of the work.

1.07 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 coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Coating Materials: Store at minimum ambient temperature 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.

1.08 FIELD CONDITIONS

A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the coating product manufacturer.

C. Do not install materials when temperature is below 55 degrees F (13 degrees C) or above 90 degrees F (32 degrees C).

D. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.

E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

F. Restrict traffic from area where coating is being applied or is curing.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for bond to substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Only materials (primers, coatings, etc.) listed in the latest edition of the MPI Approved Product List (APL) are acceptable for use on this project.

B. Provide high performance coating products from the same manufacturer.

2.02 HIGH-PERFORMANCE COATINGS

A. MPI Standards: Provide products that comply with MPI standards indicated and are listed in MPI Approved Products List.

B. Provide coating systems that meet the following minimum performance criteria, unless more stringent criteria are specified:
   1. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0, maximum, when tested in accordance with ASTM E84.
   2. NFPA 101, Class A rated.
   3. Lead Content: None.

2.03 TOP COAT MATERIALS

A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.
   1. Chromium Content, as Hexavalent Chromium, Zinc Chromate, or Strontium Chromate: None.
   2. Volatile Organic Compound (VOC) Content:
      a. Provide coatings that comply with the most stringent requirements specified in the following:
         1) 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
         2) Architectural coatings VOC limits of the State in which the Project is located.

b. 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.

3. Colors: Selected from manufacturer's standard colors.

B. Urethane Coating for exterior metal and steel elements:

1. Number of Coats: Two.
2. Top Coat(s): Polyurethane, Two-Component; MPI #72, #174.
   a. Sheen: Semi-Gloss.
   b. Products:
      1) PPG Paints; Pitthane High Build Urethane Enamel, 95-8800 Series, Semi-Gloss: www.ppgpaints.com/#sle.
      2) Sherwin-Williams Hi Solids Polyurethane 250, B65 Series: www.protective.sherwin-williams.com/#sle.
      3) Tnemec Company, Inc; Series 1095 Endura-Shield: www.tnemec.com/#sle.
      4) Substitutions: Section 01 60 00 - Product Requirements.
3. Primer: As recommended by coating manufacturer for specific substrate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Do not begin application of coatings until substrates have been properly prepared.

C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.

D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

F. Test shop-applied primer for compatibility with subsequent cover materials.

G. Proceed with coating application only after unacceptable conditions have been corrected.

1. Commencing coating application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

A. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

B. Clean surfaces of loose foreign matter.

C. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.

D. Remove finish hardware, fixture covers, and accessories and store.

E. Ferrous Metal:

1. Solvent clean according to SSPC-SP 1.
2. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning", and protect from corrosion until coated.

3.03 PRIMING

A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

3.04 COATING APPLICATION

A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified and recommendations in MPI - Architectural Painting and Specification Manual.

B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with

full coating thickness.

3.05 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.

3.06 PROTECTION

A. Protect finished work from damage.

END OF SECTION 09 96 00

SECTION 10 14 00 – SIGNS & IDENTIFYING DEVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes the fabrication and installation of exterior signage indicated in the drawings.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

C. Design Requirements: Provide signage that complies with the Americans with Disabilities Act (ADA) Accessibility Guidelines.

D. Related Sections:

1. 01 35 70 – Buy America Certification Procedures
2. 03 30 00 - Cast-In-Place Concrete
3. 05 50 00 - Metal Fabrications
4. 09 96 00 - High Performance Coatings
5. 05 70 00 - Site Railings

1.2 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of section 01 30 00, except as noted herein.

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. Section 01 40 00 – Quality Requirements
3. Section 01 60 00 – Product Requirements

B. Product Data:

1. Submit manufacturer's product specifications, anchor details and installation instructions for products used in sign fabrication.
2. Submit qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects identifying project name, address, Designer and Owner.

C. Shop Drawings:

1. Submit complete shop drawings for fabrication and installation of signs and related work including plans, elevations and details of components and attachments to other work. Indicate materials and profiles of each member, fitting, joinery, finishes, fasteners, anchorages and accessory items.
2. For structural elements include details of cuts, connections, camber, holes and other pertinent data. Indicate welds by standard AWS symbols and show size, length and type of each weld.
3. Provide setting drawings, templates and directions for the installation of anchor bolts and other anchorages to be installed in work described in other sections.

4. Show sign mounting heights, locations of supplementary supports to be provided under other Sections, and accessories.

D. Material & Finish Samples:

1. Submit (2) sets of 6” x6” samples of each sign component material showing finishes, colors and surface textures. Each submittal must be clearly labeled with sign type, color manufacturer, color name/number and finish.
2. Component material samples must be approved before completed product samples are fabricated.

E. Completed Product Samples: Upon approval of all material & finish samples, submit (2) sets of full-size sample units of completed product for the following sign types. Completed product samples must be approved before fabrication begins on remaining signs. Samples shall be retained by the Designer unless noted otherwise.

1. Sign Type A - Interpretive sign, guardrail mounted: Representative corner assembly showing frame, hardware and face panels with representative graphics.
2. Sign Type B – Interpretive sign, freestanding: Not required if sample for A displays representative graphics.
3. Stainless Steel Plaques – completed plaque for dog or canoe; approved sample may be installed.
4. Bronze Letters – representative letter “R”.

F. Maintenance Data: Include cleaning recommendations. Provide information on methods and products for field paint repair and graffiti removal.

1.3 CODES, ORDINANCES AND REGULATIONS

A. The completed installation shall conform to all applicable Federal, State and local codes, ordinances and regulations.

B. Obtain all necessary permits and inspections required by the governing authorities having jurisdiction over this work. Include associated fees in initial proposal.

C. Where specified materials or methods exceed minimum standards allowed by applicable codes, the more stringent requirement shall apply.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: For each sign form and graphic image process indicated furnish products from manufacturers regularly engaged in work of this magnitude and scope for minimum of five years.

B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with the American Welding Society (AWS) "Standard Qualification Procedure".

C. Uniformity of Manufacturers: For each sign form and graphic image process indicated furnish products of a single manufacturer.

1.5 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide signage, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by

preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.

1. Temperature Change (Range): 100 deg F, ambient; 160 deg F material surfaces.

B. Fabrication Tolerances: Sign panels shall show no visual distortion.

C. Installation Alignment: Signs will be reviewed by Owner's Rep for acceptance. Criteria will include plumbness, trueness, alignments and relationships with adjacent work.

1.6 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to insure proper fitting of work.

1.7 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Deliver work to project site when adjacent finishes are complete and ready for immediate installation.

B. Handling Materials and Equipment: Handle finished product in careful manner in order not to damage or mar surfaces of finished product or adjacent finished surfaces.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Deterioration of finishes beyond normal weathering.
   b. Deterioration of embedded graphic image.
   c. Separation or delamination of sheet materials and components.
2. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METALS

A. Steel: Provide steel in form indicated complying with the following American Society for Testing Materials (ASTM) requirements:

1. Tube: ASTM A 500, Grade B.
2. Shapes and Plates: ASTM A 36.
3. Sheet: ASTM A 240, Type 304.

B. Aluminum: Provide aluminum in the form indicated complying with the following American Society for Testing Materials (ASTM) requirements:

1. Sheets: ASTM B 209, 5052-H32.
2. Extruded Bar and Shapes: ASTM B221, Alloy 6063-T6.
3. Extruded Structural Pipe and Tube: ASTM B429, Alloy 6063-T6.

C. Stainless Steel: Provide austenitic stainless steel in form indicated complying with the following American Society for Testing Materials (ASTM) requirements:

1. Sheet: ASTM A240, Type 304.
2. Plate: ASTM A167.

D. Bronze: Provide bronze in the form indicated complying with the following requirements:

1. Sheet and Plate: 220 Commercial Bronze.

2.2 MISCELLANEOUS PRODUCTS AND MATERIALS

A. Fasteners: Of same basic metal and alloy as fastened metal, unless otherwise indicated. Do not use metals which are corrosive or otherwise incompatible with metals joined.

1. Fastening devices between dissimilar materials shall be 300 Series non-magnetic stainless steel.
2. Material: Galvanically compatible with adjacent materials.
3. Finish: Where exposed to view match adjacent material.
4. Provide concealed fasteners for interconnection of metal work components and for their attachment to other work except where exposed fasteners are indicated on the drawings.
5. Provide socket flat-head machine screws or bolts for exposed fasteners, unless otherwise indicated.

B. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS specifications, and as required for color match, strength and compatibility in the fabricated items.

C. Galvanizing: Provide a zinc coating for steel fabrication as follows:

1. ASTM A153 for galvanizing iron and steel hardware.
2. ASTM A123 for galvanizing iron and steel products made from rolled, pressed and forged steel shapes, castings, plates, bars and strips.

D. Adhesives:

1. General: Provide low or no VOC adhesives.
2. Very High Bond (VHB) Adhesive: 3M Company, product as recommended by manufacturer for type of use, materials and fabrication; or equal.
3. Silicone: FS TT-S-001543B, Class A, silicone sealant #1200, General Electric Company; or equal.
4. Epoxy: Epoxy shall be two-component thermosetting epoxy adhesive with 100% solids content. Acceptable products include #NP-428, Miracle Adhesives Corporation; Chemlok #304, Hughson Chemical Division of Lord Corporation; or equal.
5. Contact Adhesive: Contact adhesive normally associated with high pressure decorative laminates for both flat and curved surfaces.

E. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

2.3 GRAPHIC COMPONENTS AND PROCESSES

A. General:

1. All graphics, including text shall be executed in such a manner that all edges and corners are true and clean.
2. Type Sizes: As indicated on drawings for particular units.
3. Typefaces: All work to precisely replicate the typefaces as indicated on drawings.
4. Typographic Spacing: Match letter, word and line spacing as indicated on drawings for all text configurations.
5. Symbols and Imagery: Match artwork as indicated on the drawings.

B. Powder Coated Aluminum Graphic Panels:

1. Provide exterior grade, full color graphic embedded in clear powder coat as provided by the following manufacturer:
   a. Direct Embed Coating Systems
      280 N. Midland Ave, Building C-1, Unit 128
      Saddle Brook, NJ 07663
      Eric Koslow, 954-347-6812
      Email: eric@directembedcoating.com
      Web: http://www.directembedcoating.com

C. Digitally Printed Vinyl Film:

1. Material: 3M exterior grade printing film with 3M exterior grade, matte overlaminate.

D. Dimensional Metal Letters:

1. Material: As indicated on drawings.
2. Construction: Precision cut from sheet or plate in the thickness and sizes indicated on drawings. Edges shall be square to face of letter and free from cut marks or other imperfections. Corners and kerfs shall be square, or as indicated on the drawings.
3. Finish: As indicated on drawings.

E. Etched Metal Signs:

1. Material: As indicated on the drawings.
2. Etching: Photo-chemically etch artwork to a depth of .003” to .004” as required to maintain fineness of text and artwork.
3. Paint Infill: Matte gloss, color indicated on drawings.
4. Finish: As indicated on drawings.
5. Protective Coating: Provide clear satin finish protective coating.

2.4 METAL FABRICATION

A. General:

1. Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
2. For exposed work fabricate true to line and level with accurate angles and surfaces and straight sharp edges. Exposed edges shall be square unless otherwise shown. Ease corners and edges where exposed to public touch. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
3. Provide metal work composed of metals of the forms and types which comply with requirements of referenced standards and which are free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam

marks, roller marks, "oil canning", stains, discolorations or other imperfections on finished units will not be accepted.

4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, socket flat-head screws or bolts.
5. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
6. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Welded Construction:

1. Select type of weld for best appearance. Use concealed and plug welds as indicated on drawings.
2. Comply with American Welding Standards (AWS) Code for procedures, appearance and quality of welds, and methods used in correcting welding work. Select weld sizes, sequence and equipment to limit distortions to allowable tolerances. Surface "bleed" of back side welding on exposed surfaces will not be accepted.
3. Assemble and weld structural system by methods which will produce true alignment of axes without warp. Grind butt welds flush; dress all exposed welds, feather edges onto base material and polish as required for smooth painted surfaces.
4. Weld corners and seams continuously, complying with AWS recommendations. All exposed welds shall be clean, consistent and uniform in appearance. Grind and finish exposed welds smooth and flush to match adjacent contours and finish. Remove loose rust, mill scale, and spatter, slag or flux deposits.

D. Miscellaneous Trim and Hardware:

1. Provide shapes and sizes as required for profiles shown. Except as otherwise noted, fabricate units from structural steel shapes, plates and bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.
2. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for supporting of signage.
3. Fabricate items to sizes, shapes and dimensions required.

E. Holes for Other Work:

1. Provide holes required for securing other work to structural system, and for the passage of other work through steel members, as shown on the final shop drawings.
2. Provide threaded nuts welded to framing, and other specialty items as shown to receive other work.
3. Drill holes 1/16" oversize for field alignment and fitting.
4. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.

F. Shop Assembly:

1. Fabricate units to configurations indicated on reviewed shop drawings.
2. Provide required text and artwork as indicated on reviewed shop drawings.
3. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

G. Surface Preparation: After inspection and before finishing, clean metal work to be painted. Clean metal by "wheel abrader" process or other method to achieve results defined by Steel Structures Painting Council (SSPC) for "SP-6 Commercial Blast Cleaning".

H. Preparation for Shipping and Handling: Provide strippable protective coating or wrapping.

2.5 METAL FINISHES

A. General:

1. Complete cutting, fitting, forming, drilling and grinding of metal work prior to cleaning, finishing, surface treatment and application of finishes.
2. Comply with National Association of Architectural Metal Manufacturers (NAAMM) “Metal Finishes Manual” for finish designations and application recommendations to match sheet finish specified above, except where more stringent requirements are indicated.
3. Finish all joints, bends, abrasions, and other surface blemishes to match the sheet finish. Finish free of tool or construction marks, or dents.
4. Spray apply sound deadening mastic (with flame spread of 75 or less) to concealed surfaces of formed metal and other areas of flat sheets not laminated to backing as indicated on drawings.
5. Protect mechanical finishes on exposed surfaces from damage by application of removable temporary protective covering prior to shipment.

2.6 COATINGS FOR METAL

A. Acceptable Manufacturers and Products: Matthews Acrylic Polyurethane (MAP), or equal.

B. Recommended System:

1. Aluminum: Matthews Acrylic Polyurethane (MAP), Ultra Low VOC, or conventional product as required. Primers, catalysts and reducers are to be per manufacturer’s recommendations. Match colors and gloss as indicated.
2. Steel: Matthews Acrylic Polyurethane (MAP), Ultra Low VOC product. Primers, catalysts and reducers are to be per manufacturers’ recommendations. Match colors and gloss as indicated.
3. Clearcoat: Provide protective clearcoat over all painted surfaces. Use Matthews Acrylic Polyurethane (MAP), Super Satin Clear 290 228SP.

C. Field Repair: Provide system recommended by manufacturer for field repair by untrained applicators employed by Owner.

D. Application:

1. Substrates to be cleaned and surface prepared as recommended by paint manufacturer.
2. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until previous coat has flashed off as recommended by coating manufacturer. Sand between coat applications where required to produce an even, smooth surface in accordance with coating manufacturer directions.
3. Apply additional coats when undercoats or other conditions show through final coat until the cured film is of uniform finish, color and appearance.

4. Minimum Coating Thickness: Dry film thickness and application procedures to be in strict accordance with manufacturer's recommendations. Apply each material at not thinner than manufacturer's recommended spreading rate. Provide a total dry film thickness of entire coating system as recommended by manufacturer, unless otherwise indicated.
5. Apply an even film, free of surface imperfections.
6. Completed Work: Match approved samples for color, gloss, texture and coverage. Remove, refinish, or recoat work not in compliance with specified requirements.

E. Color Schedule: As indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that mounting surfaces to receive signage are properly prepared. Do not start work until conditions are satisfactory.

3.2 PREPARATION

A. Coordinate and furnish anchorages and setting drawings, diagrams, templates, instructions and directions for installation of items having integral anchors which are to be installed by others. Coordinate delivery of such items to construction site.

B. Protect mounting surfaces and adjacent areas against damage and discoloration caused by work in this section.

3.3 INSTALLATION

A. General: Locate sign units and accessories where shown or scheduled, using mounting methods of the type described and in compliance with the manufacturer's instructions. Install sign units level, plumb and at the height indicated, with sign surfaces free from distortion or other defects in appearance. Notify Owner's Rep of installation conflicts.

B. Mechanical Fastener Mounting: Install signs securely to wall with fasteners and anchoring devices as indicated on drawings and as specified.

3.4 PROTECTION

A. Protect finishes from damage during construction period, field handling and installation by use of temporary protective coverings. Protect adjacent surfaces from damage during field fabrication and installation. Remove protective covering at time of substantial completion.

B. Restore finishes damaged during installation and construction period so that no evidence remains of corrective work. Touch up any exposed fasteners and connecting hardware to match color and finish of surrounding surface. Touch up damaged surfaces carefully, using airbrush technique where necessary. Return items which cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units as required.

3.5 CLEANING

A. Clean all exposed surfaces just prior to date of substantial completion in accord with manufacturer's written cleaning instructions. Protect units from damage until acceptance.

END OF SECTION

SECTION 10 81 13
BIRD CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrified track bird deterrent system.

B. Control devices and associated wiring and connections for the work of this section.

1.02 RELATED REQUIREMENTS

A. Coordinate power and controller location with electrical.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Submit all descriptive information from the manufacturer including catalogs, installation instructions and other descriptive material.

C. Samples: Each type of hardware, including proposed fastening methods.

D. Installer's qualification statement: Provide statement by installer indicating that they are a Certified Installation Company.

E. Warranty: Provide material and installation warranty.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least 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 and approved by manufacturer.

C. Single Source Responsibility: Furnish products from one manufacturer for the entire project.

D. Obtain all technical information from the manufacturer.

E. Installer shall visit the site to gather all information of existing site conditions.

1.05 SYSTEM REQUIREMENTS

A. Electrical Requirements:
   1. Provide wiring in accordance with applicable local codes and National Electric Code Standard.
   2. Test wiring system for insulation to ground.

B. Coordination: Furnish samples of system so installation can be coordinated with existing conditions and within on-site tolerances.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products under cover and elevated above grade.

B. Protect products from damage before, during and after the installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bird-B-Gone, Inc., 2201 N. Grand Ave, #11209, Santa Ana, CA 92711; https://www.birdbgone.com.

B. Bird Barrier of America, 20925 Chico Street, Carson, CA 90746, USA; https://birdbarrier.com.

C. Substitutions: See Section 01 60 00 - Product Requirements.

D. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.

2.02 SYSTEMS

A. Bird-B-Gone, Inc., Bird Jolt Flat Track™ Bird Abatement System.

B. Bird Barrier of America, Bird-Shock® Flex-Track®.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 SYSTEM REQUIREMENTS

A. Electrical: Anti-arcing design

B. Tracks: Flexible U.V. stabilized base with corrosion resistant conductors integrated into base strip.

C. Track Lengths: In sufficient lengths to alleviate need to be spliced except at corners.

D. Spacing of System: Number of rows as determined by the manufacturer and based on project conditions.

E. Mounting Systems: As determined by the manufacturer and based on project conditions.

F. Power Supply/Charger: Provide manufacturer's recommending power supply,charger for system for long term, trouble free use.

G. Colors: Selected from manufacturer's standard colors.

2.04 ACCESSORIES

A. Fasteners: As recommended by the manufacturer.

B. Installation Hardware: Highest quality stainless steel, plastic and metal components.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that all substrates are clean, ready for installation and meet manufacturer's requirements.

3.02 PREPARATION

A. Prepare all substrates for installation as needed per manufacturer's requirements.

3.03 INSTALLATION

A. Install in accordance with manufacturer's written instructions.

3.04 SYSTEM STARTUP

A. Prepare and start equipment and systems in accordance with manufacturers' instructions and recommendations.

B. Upon completion of installation, test operation to demonstrate correct operation

C. Visually inspect system for any signs of poor installation, including loose screws, fasteners or un-removed debris.

D. Immediately correct, repair and adjust as necessary to provide a long lasting, fully full functional bird control system.

3.05 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

B. Clean system components as required by the manufacturer and keep clean until Substantial Complete of the project.

3.06 PROTECTION

A. Protect installed system from subsequent construction operations.

END OF SECTION 10 81 13

SECTION 11 6816 - PLAY STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Manufactured and shop fabricated play structures.

B. Related Sections:

1. Section 03 30 00: Cast-In-Place Concrete, for formwork, reinforcing, and concrete for play structure footings.
2. Section 32 18 16: Playground Protective Surfacing

1.02 DEFINITIONS

A. IPEMA: International Playground Equipment Manufacturer's Association.

B. CPSC: US Consumer Product Safety Commission, Guidelines for Public Playground Safety.

C. Fall Height: In accordance with ASTM F 1487, "the vertical distance between a designated play surface and the protective surfacing beneath it,".

D. Use Zone: In accordance with ASTM F 1487, the "area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment.

1.03 SYSTEM DESCRIPTION

A. Design Performance Requirements:

1. Design play structures to conform to U.S. Consumer Product Safety Commission, Handbook for Public Playground Safety.
2. Design play structures so that corners, edges, and ends of play structures have no exposed pinching and/or crushing points that may result through the unplanned movement of any piece of the structure.
3. Design play structures for children in the infant's age range of less than 2 years.
4. Design play structures for children in the tot's age range of between 2 and 5 years.
5. Design play structures for children in the kid's age range of 5 years and older.
6. Design play structures for children in the tot's and kid's age range of 2 years and older.
7. Design play structure framing for a nominal 48 inch post spacing as indicated in Drawings.

1.04 SUBMITTALS

A. Product Data: Manufacturer's specifications, data, and installation instructions.

B. Shop Drawings showing layout, dimensions and installation details for each play structure and location of impact pads.

C. Quality Assurance Submittals:

1. Design data for play structures bearing the seal and signature of a structural engineer registered in the State of Oregon.
2. Test reports for powder coated surfaces including adhesion tests in accordance with ASTM D 3359 and knife scratch tests in accordance with ASTM D 2197.

D. Maintenance Instructions: Manufacturer's complete instructions for maintenance.

E. Certification and Warranty Submittals:

1. International Playground Equipment Manufacturer's Association (IPEMA) certification.
2. Play structure manufacturer's standard 15 year warranty against structural failure due to corrosion, deterioration of components, and defective labor for aluminum posts and collars.

1.05 QUALITY ASSURANCE

A. Comply with governing codes and regulations for installation of play structures for public use.

B. Design play structures to comply with the following standards:

1. ASTM F 1487, "Standard Consumer Safety Performance Specification for Playground Equipment for Public Use."
2. US Consumer Product Safety Commission (CPSC), Guidelines for Public Playground Safety.

C. Certification: Provide certification by the International Playground Equipment Manufacturer's Association (IPEMA) that products comply with specified ASTM standards.

D. Use skilled workers who are trained and experienced in crafts and familiar with requirements and methods needed for proper performance of Work of this Section.

E. Manufacturer's Qualifications: Minimum 5 years' experience in the manufacture of play structures.

1.06 SITE CONDITIONS

A. Existing Conditions:

1. Locate existing site improvements, underground utility systems, and other below grade site improvements in area of surface and footing excavations.
2. If necessary, modify with Owner's approval play structure layout to avoid conflicts with existing underground utilities and site improvements.

1.07 DELIVERY, STORAGE, PROTECTION AND HANDLING

A. Deliver, handle, and store materials in accordance with manufacturer's instructions.

B. Store metal materials not less than 4 inches above grade.

C. Protect prefinished metal from abrasion and corrosion during storage and assembly.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers listed under section 2.5 Manufactured Playground Equipment

B. Substitutions: Submit according to requirement of Division 01 Section for "Substitutions.

2.02 CONCRETE FOOTING MATERIALS

A. Provide forms, reinforcing, and materials for concrete post footings in accordance with requirements of Section 03 3000, "Cast-In-Place Concrete," and additional requirements of this Section.

B. Forms for Post Footings:

1. Type: Cylindrical fiber forms.
2. Size: Per drawings or manufacturer's recommendations.
3. Acceptable Cylindrical Fiber Forms, one of the following:

   a. Sleek Tube by Alton.
   b. Vulco by Vulcan.
   c. Sonotube by Sonoco.
   d. Burke Tube by Burke.
   e. Or approved equal.

C. Concrete for Footings: Minimum Compressive Strength: f'c = 3,000 psi in 28 days.

2.03 MANUFACTURED PLAYGROUND EQUIPMENT

A. Banister Slide

1. Suggested Manufacturer: Columbia Cascade
2. Manufacturer Representative: David Gaston
   Outdoor Cathedral,
   outdoorcathedral@gmail.com
   office: 503-332-4308
3. Finish: stainless steel

B. Embankment Slide (6 feet)

1. Suggested Manufacturer: Columbia Cascade
2. Manufacturer Representative: David Gaston
   Outdoor Cathedral,
   outdoorcathedral@gmail.com
   office: 503-332-4308
3. Finish: stainless steel

C. Euroflex Half Balls

1. Suggested Manufacturer: Goric
   www.goric.com
2. Manufacturer Representative: Ryan Tompkins
   Goric Playgrounds,
   ryan@goric.com
   office: 617-744-0772
   cell: 253-225-1769
3. Quantity:

a. (3) Large half balls
i. color: RAL 2008 bright orange

b. (2) Medium half balls
i. color: RAL 2008 bright orange

c. (4) Small half balls
i. color: RAL 2008 bright orange

D. Hill Climber Rope

1. Suggested Manufacturer: Kompan
www.kompan.com/en/us

2. Manufacturer Representative: Shon Frostad
Kompan
shon@highwireus.com
office: 800-426-9788
cell: 253-278-3804

3. Quantity:

a. (2) Hill Climber Rope with EPDM, type 3
i. color: Venus

E. Pole Climber

1. Suggested Manufacturer: Columbia Cascade

2. Manufacturer Representative: David Gaston
Outdoor Cathedral,
outdoorcathedral@gmail.com
office: 503-332-4308

3. Quantity:

a. (8) TimberForm (poles only)
i. exposed height: (2) at 7', (3) at 6', (3) at 5'

F. Skyport Climber

1. Suggested Manufacturer: Landscape Structures

2. Manufacturer Representative: Len Fransen
Ross Recreation,
lenf@rossrec.com
office: 503-407-4890

3. Quantity:

a. (1) Disc Net Climber for 7-Post Main Structure

b. (1) Netplex 7-Post No roof

4. Color: Palette CK

G. Or approved equal for all equipment listed above.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify areas to receive products of this Section are free of impediments likely to interfere with installation and are ready to receive Work of this section.

1. Examine play structures and verify that components are undamaged and ready for field assembly.
   a. Remove and replace damaged and non-conforming products.
2. Identify location of underground utility lines on surface.
3. Correct unsatisfactory conditions prior to installation.

3.02 INSTALLATION - POSTS AND FOOTINGS

A. Lay out play structures and play surface areas.

B. Post Footings:

1. Bore 18 inch minimum diameter holes with power auger to not less than 24 inches below substrate below aggregate base course and to not less than 3 inches below bottom of support posts. Ref. manufacturer's recommendations for footing configurations.
2. Install cylindrical fiber or steel forms in the top 12 inches of soil with the top edge 4 inches above adjacent subgrade surfaces and flush with adjacent aggregate base course surface.
3. Install 24 inch long fiber forms where adjacent soil is not self supporting.

C. Installation of Posts:

1. Set post to depth with concrete cover as recommended by manufacturer of play structure equipment.
2. Firmly secure brace posts during concrete placement.
3. Place anchor rods in pipes prior to placement of concrete.
4. Fasten anchors securely to prevent dislodgement during concrete placement.

D. Installation of Reinforcing Steel:

1. Comply with CRSI Manual of Standard Practice, MSP-1.

E. Concrete Placement:

1. Wet forms and holes thoroughly with water prior to depositing concrete.
2. Do not allow water to puddle in footing excavation.
3. Place concrete in hole in continuous operation, rod and tamp concrete to consolidate concrete.
4. Trowel concrete to form a convex surface with 1/2 inch minimum slope to direct water away from posts.

F. Form Removal and Backfilling:

1. Remove forms 24 hours after concrete pour and backfill around concrete footings.
2. Compact backfill to 95 percent of maximum density at optimum moisture content according to requirements of Section 31 2000, "Earth Moving."
3. Maintain post footing in moist condition and cover footing for 7 days after concrete placement.

3.03 INSTALLATION – PLAY STRUCTURES

A. Install play structures in accordance with manufacturer's written instructions and approved Shop Drawings.

B. Install play structures plumb and level.

C. Where required or indicated, anchor playground equipment to prepared concrete footings or slabs, or other solid substrates capable of supporting equipment.

D. Installation of Shop Fabricated Play Structures:

1. Install play structure framing 7 days after concrete pour.
2. Assemble steel framing members as recommended by manufacturer.
3. Cover bolt ends with washers and caps.
4. Anchor play structures to concrete footings with anchor bolts.
5. Install fixed playground equipment level and anchor components to beams, posts, and other framing members.
6. Install components without exposed sharp surface protrusions, corners, edges, and ends.
7. Tighten anchors as securely as possible without damaging the shop finish.
8. Do not install decks and accessories until playground surface material is in place.
9. Attach decks and accessories in accordance with manufacturer's instructions.
10. Deck heights indicated in Drawings are measured either from top of playground surface material to deck surface or as spot elevations developed from existing datum.

3.04 PROTECTION

A. Protect adjacent facilities, plants, trees, ground covers, grass, paved and playground protective surfaces, and other site improvements from damage during assembly and installation of post footings and play structures.

3.05 ADJUSTING AND CLEANING

A. Replace damaged and defective play structure components.

B. Hose wash and towel dry all exposed surfaces at time of Substantial Completion.

C. Remove excess material, including footing concrete, and other construction debris from the site daily.

END OF SECTION

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

A. The intent of this Division's Specifications and Drawings is to provide a complete and workable facility, with complete systems as required by applicable codes, as indicated, and as specified.

B. Provide a complete and workable facility with complete systems that comply with the requirements of the state codes, local codes, and other authorities having jurisdiction. Include design, labor and materials required to install, test and place into operation the systems as called for in the Contract Documents and according to applicable codes and regulations.

C. Specifications and the accompanying Drawings are complementary and what is called for by one is as binding as if called for by both.

D. The General and Supplemental Conditions apply to this Division, including but not limited to:
   1. Drawings and Specifications.
   2. Public ordinances and permits.
   3. Payments and fees required by governing authorities for work of this Division.

E. The Drawings that accompany this Division are diagrammatic. They do not show every offset, bend, tee, or elbow, which may be required to install work in the space provided and avoid conflicts with other construction.

F. Provide all connections, raceway, wiring, breakers and installation required for systems specified, as required by the manufacturers installation documents, and for complete system functionality.

G. Offsets and transitions are to be assumed at a minimum at each crossing of services, structural penetrations through shear walls or beams, structural grids, where ceiling heights are restricted, and at piping and conduit mains.

H. Follow the Drawings as closely as is practical to do so and install additional bends, offsets and elbows where required by local conditions, and without additional cost to the Owner. Significant deviations from the routing shown on the drawings is subject for approval prior to installation. The right is reserved by the design team to make reasonable changes in locations of system components prior to roughing-in, without cost impact.

I. Verify dimensions, field conditions, quantities, and measurements prior to installing work.

J. Work done under this Division of the specifications includes the furnishing of labor, material, equipment, and tools required for the complete installation of the work indicated on the Drawings or as specified herein.

K. Work installed contrary to Drawings and Specifications is subject to change as directed by the Owner and no extra compensation will be allowed for making those changes.

1.02 PRICE AND PAYMENT PROCEDURES

A. Allowances
   1. Comply with Division 01, General Requirements.

B. Alternates
   1. Comply with Division 01, General Requirements.
   2. Alternates related to electrical systems:
      a. Project Base (provide description of project base as relates to electrical system)
      b. Project Alternate (provide description each alternate as relates to electrical system)
   3. Refer to Drawings for detailed information relating to the appropriate alternates.

1.03 RELATED REQUIREMENTS

A. Division 00, Procurement and Contracting Requirements

B. Division 01, General Requirements

C. Section 01 35 70 – Buy America Certification Procedures

D. Division 07, Thermal and Moisture Protection
E. Division 08, Openings
F. Division 11, Equipment
G. Division 26, Electrical

1.04 REFERENCE STANDARDS

A. Refer to individual sections under this Division for applicable reference standards
B. Abbreviations and Acronyms
C. Definitions
D. FAR American Recovery and Reinvestment Act.
E. Buy American Act construction materials.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination
1. Review Drawings of other trades and Owner provided equipment to avoid conflicts.
2. Report potential conflicts to Architect, provide resolution prior to rough-in.
3. Architectural Drawings take precedence regarding exact placement of system components and equipment.
4. Verify the physical dimensions of equipment to fit the space available.
5. Coordinate access routes through the construction, equipment move-in planning, and provide all required equipment, transport and services necessary to facilitate installation of equipment.
6. Where connections are required for equipment provided as Work of other Divisions, coordinate rough in and connection requirements for that equipment with its supplier and installer prior to commencing work.
7. Notify Architect of any discrepancies between the actual rough in and connection requirements, and those identified on Drawings for resolution prior to installation.
8. Coordinate underground work with other trades working on the site.
   a. Common trenches may be used with other trades, providing clearances required by codes and ordinances are maintained.
9. Coordinate installation of required supporting devices and set sleeves in architectural and structural components as they are constructed.
10. Coordinate location of access panels and doors for items concealed behind finished surfaces with Architect.
11. Coordinate sleeve selection and application with firestopping specified elsewhere.
12. Layout Drawings:
   a. The documents represent the design intent for the systems on the project. They do not indicate means and methods.
   b. For projects with existing conditions and renovations, the documents do not represent the installed systems or installations.
   c. Equipment arrangement shown on Drawings is diagrammatic to indicate general equipment sizing and spatial relationship. Include, as part of distribution equipment submittal, a scaled floor plan, which includes equipment shown with their submitted sizes. Include all feeder conduit routing, both aboveground and underground, including termination points at equipment. Submit for Engineer's review prior to commencing work.
   d. Provide additional wiring details at switchboards, motor control centers, and other areas where work is of sufficient complexity to warrant additional detailing for coordination.
   e. Equipment layouts will comply with all code required clearance and working areas and any additional required maintenance clearance and access areas.
   f. Submit layout drawings for approval prior to commencing field installation.

13. Arrange raceways, wiring, and equipment to permit ready access to switches, motors, and control components.
    a. Keep doors and access panels clear.
14. Coordinate electrical, telephone, and other utility services with the appropriate serving utility.
    a. No additional compensation will be allowed to the Contractor for connection fees or additional work or equipment required by the serving utility, but not covered in the Drawings or Specifications.

B. Sequencing
1. The electrical work of this project is complex in nature and has an inherent sequence, which may not be readily discernable.
2. Implement construction sequences to be the least impactive possible to current facilities and services. Where current services are required to be maintained, provide necessary equipment such temporary generators and all connections to minimize downtime and cutovers.
3. Submit construction sequences for review and coordinate sequencing with other trades.
4. Construction sequences may be provided as part of the design documents. Where provided, review, provide comments and input. The sequences indicate the general natural of the work are provided as a guide. Provide further development of the construction sequences as required to perform the work.

C. Permits
1. Obtain permits and inspections for the installation of work and pay charges required. Deliver certificates of inspection issued by authorities to the Owner.

1.06 SUBMITTALS

A. General Submittal Requirements:
1. Refer to Division 00 and Division 01 for general submittal requirements.
2. Requirements set forth in this Section pertain to all specifications included in this Division of work.
3. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

B. Pre-Bid Submittal Requirements
1. Submit Questions and Substitution Requests before the Questions deadline, defined in Division 00 and Division 01.

C. Bid Submittal Requirements
1. Refer to individual Division sections for specific requirements due with Bid.

D. Contractor Responsibilities:
1. Provide submittals one time and organized in proper order.
2. Indicate deviations from Drawings and Specifications explicitly in the submittals. Failure to comply will void review automatically.

E. Submittal Schedule:
1. General:
    a. Submit a schedule that is coordinated with the project construction schedule.
    b. Allow for time required for review of submittals, making corrections/revisions to submittals, ordering, manufacturing, fabrication, and delivery.
2. Submittal Schedule to include the following for each submittal as a minimum:
    a. Identify submittal by specification section number and title.
    b. Date the item will be submitted. Arrange items in chronological order by scheduled date for first submittal.
    c. Identify critical submittals and long lead items explicitly.
    d. Submittal Category:
        1) Product Data
        2) Coordination Drawings

3) Shop Drawings
4) Samples
5) Construction Sequences
6) Certificates
7) Delegated Design Submittals
8) Test and Evaluation Reports
9) Manufacturers' Instructions
10) Source Quality Control
11) Site Quality Control
12) Manufacturer Reports
13) Sustainable Design
14) Qualification Statements

e. Closeout Submittal Category:
1) Maintenance Contracts
2) Operations and Maintenance Data
3) Bonds
4) Warranty Documentation
5) Final Test and Evaluation Reports
6) Record Documentation
7) Demonstration and Training
8) Sustainable Design Closeout
9) Software

F. Product Data:
1. General:
a. Assemble complete submittal package for this Division into a single submittal.
1) Partial submittals will not be accepted.
b. Submit product data on following equipment for review:
1) Equipment scheduled on Drawings.
2) Equipment requiring electrical connections or connections by other trades.
3) As required by each specification section or by notes on the Drawings.
2. Format:
a. Electronic: Submit electronic copies for Work of this Division in PDF format.
1) Include a complete index in the original submittal.
(a) Incorporate links enabling navigation to each item.
(b) Identify with each item filed under a folder and labeled with its respective specification section number, Article, and paragraph.
2) Provide cover sheet for each applicable section number.
b. Hard Copy: Submit copies for Work of this Division in a 3-ring loose leaf binder.
1) Include a complete index in the original submittal.
(a) Identify with each item filed under a tab and labeled with its respective specification section number, Article, and paragraph
2) Provide cover sheet for each applicable section number.
3. Include for each item as a minimum:
a. Clearly mark and label in each submittal, the piece of equipment provided with the proper nameplate and model number identified.
b. Manufacturer's detailed shop drawings including clearances required.
c. Manufacturer's detailed specifications.
d. Manufacturer's data sheets including capacities, operating speeds, power requirements, design and operating conditions, performance curves, characteristics scheduled or described on the Drawings, and similar data.
e. List the name of the motor manufacturer and service factor for each piece of equipment.
f. Indicate equipment operating weights including bases and weight distribution at support points.

g. Wiring diagrams showing factory installed wiring.

G. Coordination Drawings:
1. General:
a. Assemble complete submittal package for the project into a minimum of two submittals.
1) Coordination Drawings - Below Grade
2) Coordination Drawings - Above Grade
b. Prepare project-specific information, drawn accurately to scale.
c. Submit coordination drawings for review prior to beginning fabrication.
d. Sheet Size: Match sheet size of Construction Drawings.
e. Prepare in two-dimensional format utilizing the same digital data software program, version, and operating system utilized to develop the Construction Drawings.
2. Format:
a. Electronic: Submit electronic copies in PDF format.
b. Hard Copy: Submit copies in a 3-ring loose leaf binder.
3. Include as a minimum:
a. Color code and overlay shop drawings for each trade:
1) Structural
2) Civil
3) Ceiling Systems
4) Lighting
5) Electrical Power
b. Complete floor plans to a minimum of 1/4-inch equals 1-foot scale.
c. Mechanical rooms to a minimum of 1/2-inch equals 1-foot scale.
d. Sections of congested areas to a minimum of 1/2-inch equals 1-foot scale.

H. Shop Drawings:
1. General:
a. Assemble complete submittal package for this Division into a single submittal.
1) Partial submittals will not be accepted.
b. Prepare project-specific information, drawn accurately to scale.
c. Submit shop drawings for review prior to beginning fabrication.
1) Additional shop drawings may be requested when it appears that coordination issues are not being resolved in the field or when there is a question as to whether contract documents are being complied with or the design intent is being met.
d. Sheet Size: Match sheet size of Construction Drawings.
e. Prepare in two-dimensional format utilizing the same digital data software program, version, and operating system utilized to develop the Construction Drawings.
2. Format:
a. Electronic: Submit electronic copies for Work of this Division in PDF format.
1) Include a complete index in the original submittal.
(a) Incorporate links enabling navigation to each item.
(b) Identify with each item filed under a folder and labeled with its respective specification section number, Article and paragraph.
b. Hard Copy: Submit copies for Work of this Division in a 3-ring loose leaf binder.
1) Include a complete index in the original submittal.
(a) Identify with each item filed under a tab and labeled with its respective specification section number, Article and paragraph.
3. Include as a minimum:
a. Complete floor plans to a minimum of 1/4-inch equals 1-foot scale.
b. Mechanical, Electrical, and Technology rooms to a minimum of 1/2-inch equals 1-foot scale.
c. Sections of congested areas to a minimum of 1/2-inch equals 1-foot scale.
d. Fabricated equipment to a minimum of 1/4-inch equals 1-foot scale.

I. Samples
   1. Refer to individual Division sections for Submittal requirements.

J. Certificates
   1. Refer to individual Division sections for Submittal requirements.

K. Delegated Design Submittals
   1. Refer to individual Division sections for Submittal requirements.

L. Test and Evaluation Reports
   1. Refer to individual Division sections for Submittal requirements.

M. Manufacturers' Instructions
   1. Refer to individual Division sections for Submittal requirements.

N. Source Quality Control Submittals
   1. Refer to individual Division sections for Submittal requirements.

O. Site Quality Control Submittals
   1. Refer to individual Division sections for Submittal requirements.

P. Manufacturer Reports
   1. Refer to individual Division sections for Submittal requirements.

Q. Sustainable Design Submittals
   1. Refer to individual Division sections for Submittal requirements.

R. Qualification Statements
   1. Refer to individual Division sections for Submittal requirements.

1.07 CLOSEOUT SUBMITTALS

A. Maintenance Contracts
   1. Refer to individual Division sections for Submittal requirements.

B. Operations and Maintenance Data
   1. General:
      a. Assemble complete submittal package for this Division into a single submittal.
         1) Partial submittals will not be accepted.
      b. Submit when the work is substantially complete.
      c. Submit manufacturer's operation and maintenance instruction manuals and parts lists for review on following equipment:
         1) Equipment scheduled on Drawings.
         2) Equipment requiring electrical connections or connections by other trades.
         3) As required by each specification section or by notes on the Drawings.
   2. Format:
      a. Electronic: Submit electronic copies for Work of this Division in PDF format.
         1) Include a complete index in the original submittal.
            (a) Incorporate links enabling navigation to each item.
            (b) Identify with each item filed under a folder and labeled with its respective specification section number, Article and paragraph.
      b. Hard Copy: Submit copies for Work of this Division in a 3-ring loose leaf binder.
         1) Include a complete index in the original submittal.
            (a) Identify with each item filed under a tab and labeled with its respective specification section number, Article and paragraph.
   3. Include for each item as a minimum:
      a. Include name and contact information for location of source parts and service for each piece of equipment.
      b. Clearly mark and label in each submittal, the piece of equipment provided with the proper nameplate and model number identified.
      c. Manufacturer's operation and maintenance instruction manuals.
      d. Manufacturer's detailed shop drawings including clearances required.

e. Manufacturer's detailed specifications.
f. Manufacturer's data sheets including capacities, operating speeds, power requirements, design and operating conditions, performance curves, characteristics scheduled or described on the Drawings, and similar data.
g. List the name of the motor manufacturer and service factor for each piece of equipment.
h. Indicate equipment operating weights including bases and weight distribution at support points.
i. Wiring diagrams showing factory installed wiring.

C. Bonds
1. Refer to individual Division 00 and Division 01 sections for Submittal requirements.

D. Warranty Documentation
1. Refer to individual Division 00 and Division 01 sections for Submittal requirements.

E. Final Test and Evaluation Reports
1. Refer to individual Division sections for Submittal requirements.

F. Record Documentation
1. Shop Drawings
a. Shop drawings updated with as-built information and submitted as the record drawing set.
2. Record Drawings
a. General:
1) Provide drawings with notations reflecting the as-built conditions.
2) Notations to include any additions to or variations from the construction documents provided as part of the BIM coordination, RFIs, ASIs, Owner Changes, and Field Coordination.
3) Prepare project-specific information, drawn accurately to scale.
4) Provide project specific title block.
b. Sheet Size: Match sheet size of Construction Drawings.
c. Prepare in two-dimensional format utilizing the same digital data software program, version, and operating system utilized to develop the Construction Drawings.
d. Format:
1) Electronic: Submit electronic copies of record drawings for Work of this Division in PDF format.
(a) Include a complete index in the original submittal.
(b) Incorporate links enabling navigation to each item.
(c) Identify with each item filed under a folder and labeled with its respective specification section number, Article and paragraph.
2) Hard Copy: Submit copies of record drawings for Work of this Division in a 3-ring loose leaf binder.
(a) Include a complete index in the original submittal.
(b) Identify with each item filed under a tab and labeled with its respective specification section number, Article and paragraph.

G. Demonstration and Training
1. Training Plan:
a. Submit outline of instructional program for demonstration and training.
b. Include the following:
1) List of training modules.
2) Schedule of proposed dates, times, length of instruction time.
3) Instructors' names for each training module.
4) Learning objective and outline for each training module.
2. Training Video Recordings:
a. Identification: On each copy, provide an applied label with the following information:
1) Name of Project.

2) Name and address of videographer.
3) Name of Architect.
4) Name of Contractor or Construction Manager.

H. Sustainable Design Closeout Documentation
1. Refer to individual Division sections for Submittal requirements.

I. Software
1. Refer to individual Division sections for Submittal requirements.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts
1. Refer to individual Division sections for Submittal requirements.

B. Extra Stock Materials
1. Refer to individual Division sections for Submittal requirements.

C. Tools
1. Refer to individual Division sections for Submittal requirements.

1.09 QUALITY ASSURANCE

A. Regulatory Requirements
1. Products and equipment are prohibited from containing pentabrominated, octabrominated and decabrominated diphenyl ethers. Where products or equipment within this specification contain these banned substances, provide complying products and equipment from approved manufacturers with equal performance characteristics.
2. General:
a. Conform Work and materials to requirements of the local, State, and Federal authorities having jurisdiction and other applicable laws and regulations.
b. Where codes or standards are referenced, the applicable portions apply.
c. Drawings, specifications, codes and standards are minimum requirements. Where requirements differ, apply the more stringent.
d. Should any change in drawings or specifications be required to comply with governing regulations, notify the Architect prior to submitting bid.
e. Execute work in strict accordance with the best practices of the trades in a thorough, substantial, skillful and well-executed manner by competent workers. Provide a competent, experienced full-time Superintendent who is authorized to make decisions on behalf of the Contractor.
f. The Architect or Architect's Representative may conduct unannounced field reviews of any work completed or in progress during the Contractor's working hours. A report will be issued to the Contractor if the field review of the systems construction has revealed elements of the work which are inconsistent with the Contract Documents. All items in the report are to be addressed in writing by the Contractor within two (2) weeks and corrections in the field made as directed.

B. Apparatus:
1. Build and install to deliver full rated capacity at the efficiency for which it was designed.
2. Provide entire system and apparatus that operate at full capacity without objectionable noise or vibration.

C. Install panels, cabinets, and equipment level and true. Provide housekeeping pads and curbs accounting for floor or roof slope.

D. Install distribution equipment and electrical enclosures fitted neatly, without gaps, openings, or distortion.
1. Properly and neatly, close unused openings with approved devices.
2. Fit surface panels, devices, and outlets with neat, appropriate, trims, plates, or covers without overhanging edges, protruding corners, or raw edges.

E. Materials and Equipment:

1. Provide new work of good quality, free of faults and defects and in conformance with the Construction documents.
2. Each piece of equipment furnished will meet the detailed requirements of the Drawings and Specifications and will be suitable for the installation shown. Equipment not meeting the requirements will not be acceptable, even though specified by name along with other manufacturers.
3. Where two or more units of the same class of equipment are furnished, use products of the same manufacturer. Component parts of the entire system need not be products of same manufacturer.
4. Furnish materials and equipment of size, make, type, and quality herein specified.
5. Equipment scheduled by performance or model number is considered as the basis of the design. If other specified manufacturer's equipment is provided in lieu of the basis of design equipment the Contractor is responsible for changes and costs which may be necessary to accommodate this equipment, including different sizes and locations for connections, different electrical characteristics, different dimensions, different access requirements, or any other differences which impact the project.

F. Workmanship:
   1. General: Install materials in a neat and professional manner.
   2. Manufacturer’s Instructions:
      a. Follow manufacturer’s directions where they cover points not specifically indicated. If they are in conflict with the Drawings and Division Specifications, obtain clarification before starting work.

G. Noise Control
   1. Do not install contactors, transformers, starters, and similar noise-producing devices on walls that are common to occupied spaces, unless otherwise indicated.
      a. Where such devices are indicated to be mounted on walls common to occupied spaces, use shock mounts, or otherwise isolate them to prevent the transmission of noise to the occupied spaces.
   2. Ballasts, contactors, starters, transformers, and like equipment which are found to be noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced.

H. Cutting and Patching:
   1. Provide cutting, patching, and repairing for the proper installation and completion of the work specified in this Division by skilled craftsmen of each respective trade in conformance with the appropriate Division of Work. This work includes but is not limited to plastering, masonry work, concrete work, carpentry work, and painting.
   2. Make additional openings required in building construction by drilling or cutting. Use of jackhammer is specifically prohibited.
   3. Fill holes which are cut oversize so that a tight fit is obtained around the sleeves passing through.
   4. Do not pierce beams, columns or structure members without approval from the Architect and structure engineer, and then only as directed.
   5. New or existing work cut or damaged will be restored to its original condition. Where alterations disturb lawns, paving, walks, etc., the surfaces will be repaired, refinished, and left in condition existing prior to commencement of work.

I. Visibly damaged goods are to be returned to the supplier and replaced at no additional cost to the Owner.

J. Contractor Responsibility:
   1. Examination of building and site responsibility:
      a. Examine site and building prior to installation to determine conditions affecting the scope of work.
      b. Contact Owner representative for arrangements.

2. Respect and protect the privacy and confidentiality of Owner, its employees, processes, products, and intellectual property to the extent necessary, consistent with the legal responsibilities of the State and Owner policies.
3. Total responsibility for the coordination and installation of the work shown and described in the Drawings and Specifications.
4. Specified systems installed under the direction of a qualified Contractor. Qualification requirements include submittal by the Contractor to the Architect of the following:
   a. Have experience with three or more installations of systems comparable in size, complexity, type, and design as specified herein.
   b. Perform each of these installations satisfactorily for at least one year after final acceptance by the user. Include the names, locations, and point of contact for these installations as a part of the initial submittal documentation.
   c. List of previous projects of this scope, size, and nature, including names and sizes of projects, description of work, time of completion, and names of contact persons for reference.

K. Manufacturers
1. Equipment in these Sections are the standard products of a manufacturer regularly engaged in the manufacture of such products unless specified otherwise. Provide commercial grade components and products used in the system that comply with these Specifications.
2. Each component of equipment identifies the manufacturer's name, model, and applicable serial number. The Owner's authorized representative retains the right to reject products that reflect, in their opinion, sub-standard design practices, manufacturing procedures, support services, or warranty policies.

L. Certifications
1. Refer to individual Division sections for Submittal requirements.

M. Sustainability Standards Certifications
1. Refer to individual Division sections for Submittal requirements.

N. Preconstruction Testing
1. Refer to individual Division sections for Submittal requirements.

O. Site Samples
1. Refer to individual Division sections for Submittal requirements.

P. Mock-ups
1. Refer to individual Division sections for Submittal requirements.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Assume custody and responsibility for the items upon delivery and determining that the contents are complete and in satisfactory condition for installation.

B. The Contractor is responsible for handling and control of equipment and liable for material loss due to delivery and storage problems.

C. Materials and equipment delivered and placed in storage will be stored with protection from the weather, humidity, and temperature variation, dirt, and dust or other contaminants.

D. Coordinate deliveries and submittals with the General Contractor/Owner to ensure a timely scheduled installation.

E. Equipment and materials are to be delivered to the site no more than three weeks prior to the commencement of its installation. Coordinate with General Contractor/Owner for the location of storage materials.

1.11 SITE CONDITIONS

A. Existing Conditions:
1. Prior to bidding, verify and become familiar with existing conditions by visiting the site.
2. Include related costs associated with site factors in the initial bid proposal.

B. Coordinate exact requirements governed by actual job conditions. Check information and report any discrepancies before fabricating work. Report changes in time to avoid unnecessary work.

C. Coordinate shutdown and start-up of existing, temporary, and new systems and utilities. Notify Owner, City, and Utility Company.

1.12 WARRANTY

A. Provide a written guarantee covering the work of this Division (for a period of one calendar year from the date of acceptance by the Owner) as required by the General Conditions.

B. Provide manufacturer's written warranties for material and equipment furnished under this Division insuring parts and labor for a period of one year from the date of Owner acceptance of Work of this Division.

C. Arrange to have the equipment factory representative present for those tests where the manufacturer's warranty could be impacted by the absence of a factory representative.

D. Correct warranty items promptly upon notification.

E. Apparatus:
   1. Free of defects of material and workmanship and in accord with the Contract Documents.
   2. Built and installed to deliver its full rated capacity at the efficiency for which it was designed.

1.13 UNINTERRUPTED SERVICE

A. Maintain electrical, signal and communication services to all functioning portions of the building throughout construction.

B. Pre-arrange with Owner outages necessary for new construction.
   1. Comply with Division 01, General Requirements.
   2. Apply for scheduled shutdowns a minimum of 4 weeks prior to time needed and reconfirm a minimum of 72 hours prior to time needed.
   3. Contractor is liable for any damages resulting from unscheduled outages or for those not confined to the pre-arranged times. Damages include costs incurred by the Owner and by the Owner's tenants.

1.14 DEMOLITION AND SALVAGE

A. General:
   1. Where affected by work, remove or relocate equipment, services, and systems encountered during the course of the remodel/construction work to a safe location that will be undisrupted by further construction.
   2. Disconnect electrical service to hard-wired equipment scheduled for removal under other Divisions of Work.
   3. Wiring which serves usable existing outlets restored and routed clear of the construction or demolition.
   4. Safely cut off and terminate wiring abandoned and removed to leave site clean.

B. Reuse of Existing:
   1. Existing concealed conduits in good condition may be reused for installation of new wiring where available.
   2. Existing undamaged, properly supported surface conduits may be reused where surface conduits are called for, if the installation meets all workmanship requirements of the Specifications.
   3. Where new wiring is added or existing wiring disturbed in existing branch circuit raceways, existing wires replaced with new.

C. Salvage and Disposal:
   1. Removed materials, not containing hazardous waste, not scheduled for reuse are the property of the Contractor for removal from the site, except for those items specifically indicated on the Drawings for salvage or reuse.
   2. Identify materials containing, or possibly containing, hazardous waste for removal and disposal by the Hazardous Waste Contractor.

3. Neatly store salvaged items at one location at the site where directed by the Owner's Representative.
4. Salvage properly operating circuit breakers from panels scheduled for removal and use to replace faulty or inadequate breakers in existing panels scheduled to remain.

1.15 COMPLETION AND TESTING

A. General:
   1. Comply with Division 01, General Requirements.

B. Upon completion, test systems to show that installed equipment operates as designed and specified, free of faults and unintentional grounds.
   1. Schedule system tests so that several occur on the same day.
   2. Coordinate testing schedule with construction phasing.
   3. Conduct tests in the presence of the Architect or its representative.
   4. Notify Architect of tests 48 hours in advance.

C. Engage a journeyman electrician with required tools to conduct equipment tests. Arrange to have the equipment factory representative present for those tests where the manufacturer's warranty could be impacted by the absence of a factory representative.

D. Perform tests per the requirements of each of the following systems:
   1. Lighting System
   2. Lighting Control System

E. Provide a written record of performance tests and submit with operation and maintenance data.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 INSTALLATION

A. Equipment Support
   1. Minimum Support Capacity:
      a. Provide fastening devices and supports for electrical equipment, luminaires, panels, outlets, and cabinets capable of supporting not less than four times the ultimate weight of the object or objects fastened to or suspended from the building structure.
   2. Powder actuated or similar shot-in fastening devices will not be permitted for any electrical work except by special permission from the Architect.

B. Equipment Connections
   1. General:
      a. Provide complete electrical connections for all items of equipment requiring such connections, including incidental wiring, materials, devices, and labor necessary for a finished working installation.
      b. Verify the location and method for connecting to each item of equipment prior to roughing-in.
      c. Check the amperage, maximum overcurrent protection, voltage, phase, and similar attributes of each item of equipment before rough in and connection.

C. Special Techniques
   1. Installation in Rated Construction
      a. Install intumescent material around ducts, conduits, and other electrical elements penetrating rated construction.
      b. Comply with firestop materials manufacturer written instructions to prevent spread of smoke or fire through sleeves or block-outs penetrating rated fire barriers.
      c. Provide firestop materials specified in Division 07, and as follows:
         1) Capable of passing a 3-hour test per ASTM E-814 (UL 1479).
         2) Consisting of material capable of expanding nominally eight times when exposed to temperatures of 250 degrees F-350 degrees F.

3) An alternate method utilizing intumescent materials in caulk or putty complying with Division 07, Thermal and Moisture Protection Section, “Through-Penetration Firestop Systems” may be used.

2. Wiring in Precast Construction
   a. Coordinate installation of electrical conduit, boxes, fittings, anchors, and miscellaneous items concealed in precast concrete assemblies with the General Contractor.
   b. Where electrical items are required to be installed in concrete assemblies precast off-site, it will be the Electrical Contractor’s responsibility to place the electrical items necessary in the concrete at the off-site locations or pay for the General Contractor to make arrangements for the installation of these items in the precast assemblies. Electrical Contractor held responsible for the proper placement and locations of electrical items at the off-site location.

D. Interface with Other Work
   1. Existing concrete, block, or brick walls are considered not accessible and may require use of Surface Mounted Raceway (SMR) if existing concealed raceway and device boxes are not available for reuse or do not meet the intent of the design (i.e., proximity to egress path, point of use, etc.). Coordinate route and installation where SMR is required with the Architect/Engineer prior to rough-in. Responsible for reinstalling SMR routed without such prior approval to the Architect’s satisfaction.
   2. Existing stud walls (wood or metal) with or without blocking with plaster, plasterboard, or paneling finish are considered accessible with accessible ceiling, attic, tunnel, or crawl space above, below, or adjacent. Remove, patch, and repair finished surface as required to conceal rough in for new device locations. If it is determined that a specific instance will not permit concealment of rough-in due to obstructions such as beams, headers, and other structural elements, prior approval before rough-in from the Architect is required.

3.02 SITE QUALITY CONTROL

A. Site Tests and Inspections

B. Non-Conforming Work

C. Manufacturer Services

3.03 CLEANING

A. Waste Management

B. General

C. Painted Surfaces:
   1. Clean scratched or marred painted surfaces of rust or other foreign matter and paint with matching color industrial enamel, except as otherwise noted.

3.04 PROTECTION

A. Protect electrical work and equipment installed under this Division against damage by other trades, weather conditions, or any other causes.
   1. Equipment found damaged or in other than new condition will be rejected as defective.

B. Keep switchgear, transformers, panels, luminaires, and electrical equipment covered or closed to exclude dust, dirt, and splashes of plaster, cement, paint, or other construction material spray.
   1. Equipment not free of contamination is not acceptable.

C. Provide enclosures and trims in new condition, free of rust, scratches, and other finish defects.
   1. If damaged, properly refinish in a manner acceptable to the Architect.

END OF SECTION

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Underground feeder and branch-circuit cable.

C. Metal-clad cable.

D. Wiring connectors.

E. Wire pulling lubricant.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes.

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation.

E. ASTM B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers.

F. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy Wire for Subsequent Covering of Insulation.

G. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape.

H. NECA 1 - Standard for Good Workmanship in Electrical Construction.

I. NECA 104 - Recommended Practice for Installing Aluminum Building Wire and Cable.

J. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC).

K. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF).

L. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.

M. NFPA 70 - National Electrical Code.

N. UL 44 - Thermoset-Insulated Wires and Cables.

O. UL 83 - Thermoplastic-Insulated Wires and Cables.

P. UL 486A-486B - Wire Connectors.

Q. UL 486C - Splicing Wire Connectors.

R. UL 486D - Sealed Wire Connector Systems.

S. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables.

T. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape.

U. UL 1569 - Metal-Clad Cables.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.

B. Buy America Act:
1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

1.05 SUBMITTALS

A. See Section 26 05 00 - Common Work Results for Electrical, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five yearsdocumented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 - PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:

1. Provide copper conductors except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.
4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.

H. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
3. Color Code:
a. 208Y/120 V, 3 Phase, 4 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral/Grounded: White.
b. 240/120 V High-Leg Delta, 3 Phase, 4 Wire System:
1) Phase A: Black.
2) Phase B (High-Leg): Orange.
3) Phase C: Blue.
4) Neutral/Grounded: White.
c. 240/120 V, 1 Phase, 3 Wire System:
1) Phase A: Black.
2) Phase B: Red.
3) Neutral/Grounded: White.
d. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
1. Copper Building Wire:
a. General
b. Essex
c. Okonite
d. Cerro Wire LLC.
e. Encore Wire Corporation.
f. General Cable Technologies Corporation.
g. Southwire Company.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
1. Feeders and Branch Circuits:
a. Size 10 AWG and Smaller: Solid.
b. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

2.04 UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE

A. Manufacturers:
1. Cerro Wire LLC.

2. Encore Wire Corporation.
3. Southwire Company.
4. Okonite

B. Description: NFPA 70, Type UF multiple-conductor cable listed and labeled as complying with UL 493, Type UF-B.

C. Provide equipment grounding conductor unless otherwise indicated.

D. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

E. Insulation Voltage Rating: 600 V.

2.05 METAL-CLAD CABLE

A. Manufacturers:
1. AFC Cable Systems Inc.
2. Encore Wire Corporation.
3. Southwire Company.
4. Okonite .

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
1. Size 10 AWG and Smaller: Solid.
2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Grounding: Full-size integral equipment grounding conductor.

G. Armor: Steel, interlocked tape.

2.06 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.

C. Wiring Connectors for Splices and Taps:
1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
3. Connectors for Aluminum Conductors: Use compression connectors.

D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
6. Aluminum Conductors: Use compression connectors for all connections.

7. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
8. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
   1. Manufacturers:
      a. 3M.
      b. Ideal Industries, Inc.
      c. NSI Industries LLC.

H. Mechanical Connectors: Provide bolted type or set-screw type.
   1. Manufacturers:
      a. Burndy LLC.
      b. Ilsco.
      c. Thomas & Betts Corporation.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
   1. Manufacturers:
      a. Burndy LLC.
      b. Ilsco.
      c. Thomas & Betts Corporation.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
   1. Manufacturers:
      a. Burndy LLC.
      b. Ilsco.
      c. Thomas & Betts Corporation.

2.07 ACCESSORIES

A. Electrical Tape:
   1. Manufacturers:
      a. 3M.
      b. Plymouth Rubber Europa.
   2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
   3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
   1. Manufacturers:
      a. 3M.
      b. American Polywater Corporation.
      c. Ideal Industries, Inc.

C. Cable Ties: Material and tensile strength rating suitable for application.
   1. Manufacturers:
      a. Burndy LLC.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated without specific routing, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
   5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
      a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
      b. Increase size of conductors as required to account for ampacity derating.
      c. Size raceways, boxes, etc. to accommodate conductors.
   8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install aluminum conductors in accordance with NECA 104.

E. Install underground feeder and branch-circuit cable (Type UF-B) in accordance with NECA 121.

F. Install metal-clad cable (Type MC) in accordance with NECA 120.

G. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

H. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

I. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
   1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

J. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

K. Install conductors with a minimum of 12 inches of slack at each outlet.

L. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

M. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

N. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

O. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

P. Insulate ends of spare conductors using vinyl insulating electrical tape.

Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
   1. Includes oxide inhibiting compound.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 56 00 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.03 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems.

E. NFPA 70 - National Electrical Code.

F. UL 467 - Grounding and Bonding Equipment.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   3. For signal reference grids, coordinate the work with access flooring furnished in accordance with Section 09 69 00.
   4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install ground rod electrodes until final backfill and compaction is complete.

C. Buy America Act:
   1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

1.05 SUBMITTALS

A. See Section 26 05 00 - Common Work Results for Electrical, for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

D. Shop Drawings:
   1. Indicate proposed arrangement for signal reference grids. Include locations of items to be bonded and methods of connection.

E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

F. Field quality control test reports.

G. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Installer Qualifications for Signal Reference Grids: Company with minimum five years documented experience with high frequency grounding systems.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.

B. Do not use products for applications other than as permitted by NFPA 70 and product listing.

C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

E. Grounding System Resistance:
   1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
   2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
   3. Between Grounding Electrode System and Major Electrical Equipment Frames, System Neutral, and Derived Neutral Points: Not greater than 0.5 ohms, when tested using "point-to-point" methods.

F. Grounding Electrode System:
   1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
      a. Provide continuous grounding electrode conductors without splice or joint.

b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.

2. Metal In-Ground Support Structure:
   a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
3. Concrete-Encased Electrode:
   a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
4. Ground Rod Electrode(s):
   a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
   b. Space electrodes not less than 10 feet from each other and any other ground electrode.
   c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
   d. Provide ground enhancement material around electrode where indicated.
   e. Provide ground access well for each electrode.
5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
6. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.

G. Service-Supplied System Grounding:
   1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
   2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.

H. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
   1. Provide grounding electrode system for each separate building or structure.
   2. Provide equipment grounding conductor routed with supply conductors.
   3. For each disconnecting means, provide grounding electrode conductor to connect equipment ground bus to grounding electrode system.
   4. Do not make any connections and remove any factory-installed jumpers between neutral (grounded) conductors and ground.

I. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.

J. Pole-Mounted Luminaires: Also comply with Section 26 56 00.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).
   2. Factory Pre-fabricated Bonding Jumpers: Furnished with factory-installed ferrules; size braided cables to provide equivalent gauge of specified conductors.

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
      a. Exceptions:
   3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
   4. Manufacturers - Mechanical and Compression Connectors:
      a. Advanced Lightning Technology (ALT).
      b. Burndy LLC.
      c. Harger Lightning & Grounding.
      d. Thomas & Betts Corporation.
      e. Substitutions: See Section 01 60 00 - Product Requirements.
   5. Manufacturers - Exothermic Welded Connections:
      a. Burndy LLC.
      b. Cadweld, a brand of Erico International Corporation.
      c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

D. Ground Rod Electrodes:
   1. Comply with NEMA GR 1.
   2. Material: Copper-bonded (copper-clad) steel.
   3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
   4. Where rod lengths of greater than 10 feet are indicated or otherwise required, sectionalized ground rods may be used.
   5. Manufacturers:
      a. Advanced Lightning Technology (ALT).
      b. Erico International Corporation.
      c. Galvan Industries, Inc.
      d. Harger Lightning & Grounding.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

E. Ground Enhancement Material:
   1. Description: Factory-mixed conductive material designed for permanent and maintenance-free improvement of grounding effectiveness by lowering resistivity.
   2. Resistivity: Not more than 20 ohm-cm in final installed form.
   3. Manufacturers:
      a. Erico International Corporation.
      b. Harger Lightning & Grounding.

c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC.
d. Substitutions: See Section 01 60 00 - Product Requirements.

F. Oxide Inhibiting Compound: Comply with Section 26 05 19.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
2. Indoor Installations: Unless otherwise indicated, install with 4 inches of top of rod exposed.

D. Make grounding and bonding connections using specified connectors.
1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 26 05 53.

F. Ufer Ground: Provide a concrete encased building grounding electrode where shown on the Drawings. Gounding electrode to consist of a minimum of 20 feet of #4 AWG copper conductor cast into the bottom 6 inches of an exterior concrete foundation or footing.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 05 50 00 - Metal Fabrications: Materials and requirements for fabricated metal supports.

C. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

D. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

E. Section 26 56 00 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

D. MFMA-4 - Metal Framing Standards Publication.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction.

F. NFPA 70 - National Electrical Code.

G. UL 5B - Strut-Type Channel Raceways and Fittings.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

C. Buy America Act:
   1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

1.05 SUBMITTALS

A. See Section 26 05 00 - Common Work Results for Electrical, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

D. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.

E. Installer's Qualification Statement: Include evidence of compliance with specified requirements.

F. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

D. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Materials for Metal Fabricated Supports: Comply with Section 05 50 00.

C. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
2. Conduit Clamps: Bolted type unless otherwise indicated.
3. Manufacturers:
a. Cooper Crouse-Hinds, a division of Eaton Corporation.
b. Erico International Corporation.
c. O-Z/Gedney, a brand of Emerson Electric Co.
d. Thomas & Betts Corporation.
e. Substitutions: See Section 01 60 00 - Product Requirements.

D. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
1. Manufacturers:
a. Cooper Crouse-Hinds, a division of Eaton Corporation.
b. Erico International Corporation.
c. O-Z/Gedney, a brand of Emerson Electric Co.
d. Thomas & Betts Corporation.
e. Substitutions: See Section 01 60 00 - Product Requirements.

E. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.
2. Channel (Strut) Used as Raceway (only where specifically indicated): Listed and labeled as complying with UL 5B.
3. Channel Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
4. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
5. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
6. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation.
b. Thomas & Betts Corporation.
c. Unistrut, a brand of Atkore International Inc.
d. Substitutions: See Section 01 60 00 - Product Requirements.
e. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.

F. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch diameter.
b. Busway Supports: 1/2 inch diameter.
c. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch diameter.
d. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch diameter.
e. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
f. Outlet Boxes: 1/4 inch diameter.
g. Luminaires: 1/4 inch diameter.

G. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
4. Manufacturers:
   a. Cooper B-Line, a division of Eaton Corporation.
   b. Erico International Corporation.
   c. PHP Systems/Design.
   d. Unistrut, a brand of Atkore International Inc.
   e. Substitutions: See Section 01 60 00 - Product Requirements.

H. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Plastic and lead anchors are not permitted.
10. Powder-actuated fasteners are not permitted.
    a. Where approved by Architect.
    b. Use only threaded studs; do not use pins.
11. Hammer-driven anchors and fasteners are not permitted.
    a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction (when specified).
    b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction (when specified).
12. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
    d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
13. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
14. Manufacturers - Mechanical Anchors:
    a. Hilti, Inc.
    b. ITW Red Head, a division of Illinois Tool Works, Inc.
    c. Powers Fasteners, Inc.
    d. Simpson Strong-Tie Company Inc.
    e. Substitutions: See Section 01 60 00 - Product Requirements.
15. Manufacturers - Powder-Actuated Fastening Systems:
    a. Hilti, Inc.
    b. ITW Ramset, a division of Illinois Tool Works, Inc.
    c. Powers Fasteners, Inc.
    d. Simpson Strong-Tie Company Inc.
    e. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

H. Field-Welding (where approved by Architect): Comply with Section 05 50 00.

I. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

J. Conduit Support and Attachment: Also comply with Section 26 05 33.13.

K. Box Support and Attachment: Also comply with Section 26 05 33.16.

L. Exterior Luminaire Support and Attachment: Also comply with Section 26 56 00.

M. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

N. Secure fasteners according to manufacturer's recommended torque settings.

O. Remove temporary supports.

P. Identify independent electrical component support wires above accessible ceilings (only where specifically indicated or permitted) with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 05 33.13 - CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Electrical metallic tubing (EMT).

C. Rigid polyvinyl chloride (PVC) conduit.

D. Conduit fittings.

E. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 03 30 00 - Cast-in-Place Concrete: Concrete encasement of conduits.

C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.

D. Section 26 05 29 - Hangers and Supports for Electrical Systems.

E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

F. Section 31 23 16 - Excavation.

G. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

H. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC).

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT).

E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

F. NFPA 70 - National Electrical Code.

G. UL 6 - Electrical Rigid Metal Conduit-Steel.

H. UL 514B - Conduit, Tubing, and Cable Fittings.

I. UL 797 - Electrical Metallic Tubing-Steel.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
   4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

C. Buy America Act:
   1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

1.05 SUBMITTALS

A. See Section 26 05 00 - Common Work Results for Electrical, for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

C. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

D. Shop Drawings:
   1. Indicate proposed arrangement for conduits to be installed within structural concrete slabs, where permitted.
   2. Include proposed locations of roof penetrations and proposed methods for sealing.

E. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use galvanized steel rigid metal conduit, PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
   2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit, PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
   3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit, PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).

4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
5. Where rigid polyvinyl (PVC) conduitlarger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
6. Where steel conduit is installed in direct contact with earthwhere soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use PVC-coated galvanized steel rigid metal conduit.
7. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.

D. Embedded Within Concrete:
1. Within Slab on Grade(within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit, PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
2. Within Slab Above Ground(within structural slabs only where approved by Structural Engineer): Use galvanized steel rigid metal conduit, PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
3. Within Concrete Walls Above Ground: Use galvanized steel rigid metal conduit, PVC-coated galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.
5. Where electrical metallic tubing (EMT) emerges from concrete into salt air, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.

E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).

J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
1. Locations subject to physical damage include, but are not limited to:
   a. Where exposed below 8 feet, except within electrical communications rooms or closets.
   b. Where exposed below 20 feet in warehouse areas.

K. Exposed, Exterior: Use galvanized steel rigid metal conduit or PVC-coated galvanized steel rigid metal conduit.

L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

M. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit or MC cable whip.
1. Maximum Length: 6 feet.

N. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.

B. Electrical Service Conduits: Also comply with Section 26 21 00.

C. Fittings for Grounding and Bonding: Also comply with Section 26 05 26.

D. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

E. Provide products listed, classified, and labeled as suitable for the purpose intended.

F. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 3/4 inch (21 mm) trade size.
   2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
   3. Control Circuits: 3/4 inch (21 mm) trade size.
   4. Flexible Connections to Luminaires: 1/2 inch (16 mm) trade size.
   5. Underground, Interior: 3/4 inch (21 mm) trade size.
   6. Underground, Exterior: 3/4 inch (21 mm) trade size.

G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit.
   2. Republic Conduit.
   3. Wheatland Tube Company.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc.
      b. O-Z/Gedney, a brand of Emerson Electric Co.
      c. Thomas & Betts Corporation.
   2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
   4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
   1. Allied Tube & Conduit.
   2. Republic Conduit.
   3. Wheatland Tube Company.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
   1. Manufacturers:
      a. Bridgeport Fittings Inc.
      b. O-Z/Gedney, a brand of Emerson Electric Co.
      c. Thomas & Betts Corporation.
   2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   3. Material: Use steel or malleable iron.
   4. Connectors and Couplings: Use compression (gland) or set-screw type.

a. Do not use indenter type connectors and couplings.

5. Use in dry protected locations for circuites rated 600V and less. Exceptions:
   a. EMT is acceptable for outdoor use in photovoltaic roof applications.
   b. EMT is acceptable for other outdoor applications in covered locations.
   c. For outdoor applications, raintight fittings must be used.

2.05 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.

B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated without specific routing, determine exact routing required.
   3. Conceal all conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Mechanical equipment rooms.
      c. Within joists in areas with no ceiling.
   5. Unless otherwise approved, do not route conduits exposed:
      a. Across floors.
      b. Across roofs.
      c. Across top of parapet walls.
      d. Across building exterior surfaces.
   6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
   7. Arrange conduit to maintain adequate headroom, clearances, and access.
   8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
   9. Arrange conduit to provide no more than 150 feet between pull points.
   10. Route conduits above water and drain piping where possible.
   11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
   12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
   13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
      a. Heaters.
      b. Hot water piping.
      c. Flues.

14. Group parallel conduits in the same area together on a common rack.

E. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide required vibration isolation and/or seismic controls in accordance with Section 26 05 48.
3. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
4. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
5. Use conduit strap to support single surface-mounted conduit.
   a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
6. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
7. Use conduit clamp to support single conduit from beam clamp or threaded rod.
8. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
9. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
10. Use of spring steel conduit clips for support of conduits is permitted only as follows:
    a. Support of electrical metallic tubing (EMT)up to 1 inch (27 mm) trade size concealed above accessible ceilings and within hollow stud walls.
11. Use of wire for support of conduits is permitted only as follows:
    a. For securing conduits to studs in hollow stud walls.
    b. For suspending conduits supported by spring steel conduit clips (only where specifically indicated or permitted).
12. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.

F. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
5. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

G. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.

6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.

H. Underground Installation:
1. Provide trenching and backfilling in accordance with Section 31 23 16.13.
2. Provide trenching and backfilling in accordance with Section 31 23 16 and Section 31 23 23.
3. Minimum Cover, Unless Otherwise Indicated or Required:
   a. Underground, Exterior: 24 inches.
   b. Under Slab on Grade: 12 inches to bottom of slab.
4. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length for service entrance where not concrete-encased.

I. Embedment Within Structural Concrete Slabs (only where approved by Structural Engineer):
1. Include proposed conduit arrangement with submittals.
2. Maximum Conduit Size: 3/4 inch (21 mm) unless otherwise approved.
3. Install conduits within middle one third of slab thickness.
4. Secure conduits to prevent floating or movement during pouring of concrete.

J. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section 03 30 00 with minimum concrete cover of 3 inches on all sides unless otherwise indicated.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where conduits are subject to earth movement by settlement or frost.

L. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

M. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

N. Provide grounding and bonding in accordance with Section 26 05 26.

O. Identify conduits in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective conduits.

3.04 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.05 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 05 33.16 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Boxes and enclosures for integrated power, data, and audio/video.

D. Boxes for hazardous (classified) locations.

E. Floor boxes.

F. Underground boxes/enclosures.

G. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

B. Section 26 05 33.13 - Conduit for Electrical Systems:
   1. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 27 26 - Wiring Devices:
   1. Wall plates.
   2. Floor box service fittings.
   3. Additional requirements for locating boxes for wiring devices.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

F. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

G. NFPA 70 - National Electrical Code.

H. SCTE 77 - Specification for Underground Enclosure Integrity.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations.

K. UL 508A - Industrial Control Panels.

L. UL 514A - Metallic Outlet Boxes.

M. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
   6. Coordinate the work with other trades to preserve insulation integrity.
   7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
   8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Buy America Act:
   1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

1.05 SUBMITTALS

A. See Section 26 05 00 - Common Work Results for Electrical, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.
   1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.

C. Samples:
   1. Floor Boxes: Provide one sample(s) of each floor box proposed for substitution upon request.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Keys for Lockable Enclosures: Two of each different key.

G. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
   4. Use cast aluminum boxes where aluminum rigid metal conduit is used.
   5. Use nonmetallic boxes where exposed rigid PVC conduit is used.
   6. Use suitable concrete type boxes where flush-mounted in concrete.
   7. Use suitable masonry type boxes where flush-mounted in masonry walls.
   8. Use raised covers suitable for the type of wall construction and device configuration where required.
   9. Use shallow boxes where required by the type of wall construction.
   10. Do not use "through-wall" boxes designed for access from both sides of wall.
   11. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   12. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   13. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
   14. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
   15. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
   16. Minimum Box Size, Unless Otherwise Indicated:
      a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
      b. Communications Systems Outlets: Comply with Section 27 10 00.
      c. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
      d. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
   17. Wall Plates: Comply with Section 26 27 26.

18. Manufacturers:
    a. Cooper Crouse-Hinds, a division of Eaton Corporation.
    b. Hubbell Incorporated; Bell Products.
    c. Hubbell Incorporated; RACO Products.
    d. O-Z/Gedney, a brand of Emerson Electric Co.
    e. Thomas & Betts Corporation.
    f. Substitutions: See Section 01 60 00 - Product Requirements.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    a. Indoor Clean, Dry Locations: Type 1, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
    b. Boxes 6 square feet and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
    b. Back Panels: Painted steel, removable.
    c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation.
    b. Hoffman, a brand of Pentair Technical Products.
    c. Hubbell Incorporated; Wiegmann Products.
    d. Substitutions: See Section 01 60 00 - Product Requirements.

D. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may be used.
1. Manufacturers:
    a. Hubbell Incorporated.
    b. Substitutions: See Section 01 60 00 - Product Requirements.

E. Floor Boxes:
1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 26 27 26; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
2. Use cast iron floor boxes within slab on grade.
3. Use sheet-steel or cast iron floor boxes within slab above grade.
4. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).
5. Manufacturer: Same as manufacturer of floor box service fittings.

F. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
4. Provide logo on cover to indicate type of service.

5. Applications:
   a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
   b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 15 load rating.
   c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
   a. Manufacturers:
      1) Hubbell Incorporated; Quazite Products.
      2) MacLean Highline.
      3) Oldcastle Precast, Inc.
      4) Substitutions: See Section 01 60 00 - Product Requirements.
   b. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.
   c. Product(s):
      1) MacLean Highline PHA Series: Straight wall, all-polymer concrete splice box/pull box; available Tier 8, Tier 15, and Tier 22 load ratings.
         (a) 11 by 18 by 12 inches nominal; Model PHA111812 (stackable).
      2) MacLean Highline CHA Series: Fiberglass/polymer concrete splice box/pull box; available Tier 8 and Tier 15 load ratings.
         (a) 11 by 18 by 12 inches nominal; Model CHA111812.
      3) MacLean Highline CVA Series: Fiberglass/polymer concrete splice vault; available Tier 8, Tier 15, and Tier 22 load ratings.
         (a) 30 by 48 by 18 inches nominal; Model CVA304818.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

H. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 31 00 as required where approved by the Architect.
   2. Unless dimensioned, box locations indicated are approximate.
   3. Locate boxes as required for devices installed under other sections or by others.
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.
      b. Communications Systems Outlets: Comply with Section 27 10 00.
   4. Locate boxes so that wall plates do not span different building finishes.

5. Locate boxes so that wall plates do not cross masonry joints.
6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
    a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
    b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.
11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
    a. Concealed above accessible suspended ceilings.
    b. Within joists in areas with no ceiling.
    c. Electrical rooms.
    d. Mechanical equipment rooms.

I. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.

J. Install boxes plumb and level.

K. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

L. Floor-Mounted Cabinets: Mount on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.

M. Install boxes as required to preserve insulation integrity.

N. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.

O. Nonmetallic Floor Boxes: Cut box flush with finished floor after concrete pour.

P. Underground Boxes/Enclosures:
1. Install enclosure on gravel base, minimum 6 inches deep.
2. Flush-mount enclosures located in concrete or paved areas.

3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.
4. Provide cast-in-place concrete collar constructed in accordance with Section 03 30 00, minimum 10 inches wide by 12 inches deep, around enclosures that are not located in concrete areas.
5. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

Q. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

R. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

S. Close unused box openings.

T. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

U. Provide grounding and bonding in accordance with Section 26 05 26.

V. Identify boxes in accordance with Section 26 05 53.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Underground warning tape.

F. Floor marking tape.

G. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 09 90 00 Painting and Coating.

C. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

D. Section 26 27 26 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels.

C. NFPA 70 - National Electrical Code.

D. NFPA 70E - Standard for Electrical Safety in the Workplace.

E. UL 969 - Marking and Labeling Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

C. Buy America Act:
   1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

1.05 SUBMITTALS

A. See Section 26 05 00 - Common Work Results for Electrical, for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

D. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

E. Samples:
   1. Identification Nameplates: One of each type and color specified.
   2. Warning Signs and Labels: One of each type and legend specified.

F. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.07 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 - PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.

B. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify power source and circuit number. Include location when not within sight of equipment.
         4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
         5) Use typewritten circuit directory to identify load(s) served for panelboards with a door.Identify spares and spaces.
         6) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device.Identify spares and spaces.
      b. Enclosed switches, circuit breakers, and motor controllers:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Identify load(s) served. Include location when not within sight of equipment.
   2. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
   3. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
   4. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
   5. Use identification labelon inside of door at each fused switch to identify required NEMA fuse class and size.
   6. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
      a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 09 91 23 and 09 91 13.

7. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations require documentation by NFPA 70.
8. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
   a. Minimum Size: 3.5 by 5 inches.
   b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.
   c. Service Equipment: Include the following information in accordance with NFPA 70.
      1) Nominal system voltage.
      2) Available fault current.
      3) Clearing time of service overcurrent protective device(s).
      4) Date label applied.
9. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.

C. Identification for Conductors and Cables:
   1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
   2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
   3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
      a. At each source and load connection.
      b. Within boxes when more than one circuit is present.
      c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
   4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
   5. Use underground warning tape to identify direct buried cables.

D. Identification for Raceways:
   1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
   2. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
      a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
         1) Field-Painting: Comply with Section 09 91 23 and 09 91 13.
         2) Vinyl Color Coding Electrical Tape: Comply with Section 26 05 19.
   3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
   4. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
   5. Use underground warning tape to identify underground raceways.
   6. Use voltage markers to identify highest voltage present for wireways at maximum intervals of 20 feet.

E. Identification for Boxes:
   1. Use voltage markers to identify highest voltage present.
   2. Use voltage markers or color coded boxes to identify systems other than normal power system.
      a. Color-Coded Boxes: Field-painted in accordance with Section 09 91 23 and 09 91 13 per the same color code used for raceways.
   3. Use handwritten text using indelible marker to identify circuits enclosed.
      a. For exposed boxesin public areas, provide identification on inside face of cover.

F. Identification for Devices:
   1. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.
   2. Factory Pre-Marked Wallplates: Comply with Section 26 27 26.
   3. Use identification label to identify fire alarm system devices.
      a. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.
   4. Use identification label to identify serving branch circuitfor all receptacles.
      a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
   5. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.
   6. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

G. Identification for Luminaires:

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
   1. Manufacturers:
      a. Brady.
      b. 3M.
      c. Brimar Industries, Inc.
      d. Kolbi Pipe Marker Co.
      e. Seton Identification Products.
      f. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Materials:
      a. Indoor Clean, Dry Locations: Use plastic nameplates.
      b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
   3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
      a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
   4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
   5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
   6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
   1. Manufacturers:
      a. 3M.
      b. Brady Corporation.
      c. Brother International Corporation.
      d. Panduit Corp.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
   a. Use only for indoor locations.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
   a. System designation where applicable:
   b. Equipment designation or other approved description.
   c. Other information as indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
   a. System Designation: 1 inch.
   b. Equipment Designation: 1/2 inch.
   c. Other Information: 1/4 inch.
   d. Exception: Provide minimum text height of 1 inch for equipment located more than 10 feet above floor or working platform.
5. Color:
   a. Normal Power System: White text on black background.
      1) 208Y/120 V, 3 Phase Equipment: White text on red background.

D. Format for General Information and Operating Instructions:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch.
5. Color: Black text on white background unless otherwise indicated.
   a. Exceptions:

E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches by 4 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch.
5. Color: Black text on yellow background unless otherwise indicated.

F. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Power source and circuit number or other designation indicated.
   a. Include voltage and phase for other than 120 V, single phase circuits.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

G. Format for Control Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Load controlled or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

2.03 WIRE AND CABLE MARKERS

A. Manufacturers:
1. 3M.

2. Brady Corporation.
3. HellermannTyton.
4. Panduit Corp.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
1. Do not use self-adhesive type markers.

C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

D. Legend: Power source and circuit number or other designation indicated.

E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
1. Do not use handwritten text.

F. Minimum Text Height: 1/8 inch.

G. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Manufacturers:
1. 3M.
2. Brady Corporation.
3. Brimar Industries, Inc.
4. Seton Identification Products.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Minimum Size:
1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.

C. Legend:
1. Markers for Voltage Identification: Highest voltage present.
2. Markers for System Identification:
a. Other Systems: Type of service.

D. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

A. Manufacturers:
1. Brady Corporation.
2. Brimar Industries, Inc.
3. Seton Identification Products.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
1. Exception: Use foil-backed detectable type tape where required by serving utility or where directed by Owner.

C. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.

D. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.

E. Legend: Type of service, continuously repeated over full length of tape.

F. Color:
1. Tape for Buried Power Lines: Black text on red background.

2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.06 FLOOR MARKING TAPE

A. Manufacturers:
1. 3M.
2. Brady Corporation.
3. Brimar Industries, Inc.
4. Seton Identification Products.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches wide, with alternating black and white stripes.

2.07 WARNING SIGNS AND LABELS

A. Manufacturers:
1. Brimar Industries, Inc.
2. Clarion Safety Systems, LLC.
3. Seton Identification Products.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

C. Warning Signs:
1. Materials:
a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
3. Minimum Size: 7 by 10 inches unless otherwise indicated.

D. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
a. Do not use labels designed to be completed using handwritten text.
b. Provide polyester overlaminate to protect handwritten text.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Inside of equipment door.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Elevated Equipment: Legible from the floor or working platform.
5. Branch Devices: Adjacent to device.
6. Interior Components: Legible from the point of access.
7. Conduits: Legible from the floor.
8. Boxes: Outside face of cover.

9. Conductors and Cables: Legible from the point of access.
10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
   1. Do not use adhesives on exterior surfaces except where substrate cannot be penetrated.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

G. Secure rigid signs using stainless steel screws.

H. Mark all handwritten text, where permitted, to be neat and legible.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 05 83 - WIRING CONNECTIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.

C. Section 26 05 33.13 - Conduit for Electrical Systems.

D. Section 26 05 33.16 - Boxes for Electrical Systems.

E. Section 26 27 26 - Wiring Devices.

1.03 REFERENCE STANDARDS

A. NEMA WD 1 - General Color Requirements for Wiring Devices.

B. NEMA WD 6 - Wiring Devices - Dimensional Specifications.

C. NFPA 70 - National Electrical Code.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.

B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

A. See Section 26 05 00 - Common Work Results for Electrical, for submittal procedures.

B. Product Data: Provide wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 ADMINISTRATIVE REQUIREMENTS

A. Buy America Act:
   1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Comply with NEMA WD 1.
   2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
   3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Wiring Devices: As specified in Section 26 27 26.

C. Flexible Conduit: As specified in Section 26 05 33.13.

D. Wire and Cable: As specified in Section 26 05 19.

E. Boxes: As specified in Section 26 05 33.16.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

J. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

END OF SECTION

SECTION 26 09 23 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Control Stations.

B. Photosensor.

C. Relays, Switchpacks, and Room Controllers.

D. Power Supplies and Transformers.

E. Low Voltage Control Wiring.

F. Test Equipment.
   1. Responsibilities and participation under Division 26, Electrical in the automatic dimming system installation and commissioning process.
   2. Installation, connection, adjustment, and testing of the equipment including labor, materials, tools, appliances.

1.02 RELATED SECTIONS

A. Section 01 35 70 – Buy America Certification Procedures

1.03 GENERAL REQUIREMENTS

A. Provide qualified personnel for participation in commissioning tests, including seasonal testing required after the initial commissioning.

B. Providing equipment, materials, and labor necessary to correct deficiencies found during the commission process which fulfill contract and warranty requirements.

C. Provide Operating and Maintenance Data and Record Drawings to the Test Engineer for verification, organization, and distribution.

D. Provide assistance to the Test Engineer to develop and edit descriptions of system operation.

E. Providing training for the systems specified in this Division with coordination by the Test Engineer and Commissioning Agent.

1.04 SUBMITTALS

A. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, installed features, system wiring schematics, and user interface components.

B. Shop Drawings:
   1. Submittal drawings with a complete system diagram to show quantity of devices, location in the building, dimensions and required wiring.
   2. Occupancy sensors, show the required quantity to cover the space controlled (note: this may be more than the quantity shown on the drawings).
   3. The locations shown on the drawings are for reference only and coordinated with the manufacturer and Architect for final quantity and location during the bid process to allow for allowance of proper quantity, wiring lengths and installation coordination.

C. Samples:
   1. Provide physical samples of user interface devices and visually exposed control devices for approval by Owner and Architect.

D. Operation and Maintenance Manuals:
   1. Include product data of system components, one line diagrams of installed components and their locations throughout the building, a final floor plan noting the locations of devices installed above ceilings, behind access panels or in concealed but accessible spaces and the lighting zones or devices they control.
   2. Final relay schedule with the zone of control, location of control zone, voltage, power feed, time clock setting, photocell set point, switch, or dimmer stations controlling the relay, and sweep function set points will be provided by the Contractor.

E. Project Record Documents: Record actual installed locations and settings for lighting control devices.

F. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.07 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.08 SYSTEM DESCRIPTION

A. Control Stations:
   1. Control Station Types:
      a. Provide control stations for occupant lighting control as scheduled on the drawings and may include and/or combine the following type of individual control type within a single station:
         1) Scene Selection
         2) On/Off Switching
         3) Dimming Raise/Lower
         4) Occupancy/Vacancy Sensor

B. Relays, Switchpacks, and Room Controllers:
   1. Analog and Digital: Room controller devices to accept line voltage input as well as input from any combination of control stations, occupancy/vacancy sensors and/or daylight sensors and produce the required effect (switching or dimming) on up to four zones of connected lighting.

C. Occupancy/Vacancy Sensing:
   1. Reduce electric energy consumption by reducing or eliminating lighting energy use in unoccupied spaces by switching lighting off with occupancy and/or vacancy sensors.

D. Photoelectric Daylight Harvesting:
   1. Daylit Areas:
      a. Reduce electric energy consumption during daylight hours by reducing the light output of the electric lighting system via switching in response to measured lighting levels provided by daylight within the building interior.
      b. Dimming zones will correlate with the distribution of daylight within the space as noted on plans.

E. Emergence Override: Provide automatic load control relay devices for controlling egress lighting circuiting.

1.09 ADMINISTRATIVE REQUIREMENTS

A. Buy America Act:
   1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

PART 2 - PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Basis of Design Manufacturer:
   1. Cooper Controls (Greengate, Fifth Light)
   2. Wattstopper
   3. Lutron
   4. Acuity Controls (nLight, LC&D, Sensor Switch)
   5. PLC Multipoint
   6. Hubbell
   7. Encelium

B. Approved Basis of Design Alternate Manufacturers:
   1. Cooper Controls
   2. Wattstopper
   3. Lutron
   4. Acuity Controls (nLight, LC&D, Sensor Switch)
   5. PLC Multipoint
   6. Hubbell
   7. Encelium

C. Products described in this section are to be provided by the single BOD (basis of design) or approved alternate manufacturer listed above, or by a compatible, BOD approved third party alternate manufacturer.
   1. Manufacturer series numbers are identified herein to establish the minimum level of quality for each product.
   2. Comparable products that meet the requirements of the specification by other acceptable manufacturers identified herein are acceptable with prior approval.
   3. Other or equivalent Manufacturers and Products: Submit Substitution Request, complying with requirements.

2.02 CONTROL STATIONS

A. Control Station Types:
   1. Scene Select: Provide five scene selection control station including discrete, engraveable pushbuttons allowing on/off and raise/lower control of entire space and means for occupants to select from five scenes.
   2. On/Off:
      a. Provide individual pushbuttons.
      b. Controls lighting in entire space if no zones indicated on plans.
   3. Dimming/Raise Lower:
      a. Provide individual pushbuttons for on and off control of zones indicated on plans.
      b. Controls lighting in entire space if no zones indicated on plans.
      c. Dimming accomplished by press and hold the ON and OFF buttons for dimming up and down respectively.
   4. Integral Occupancy:
      a. Automatically switches lighting on when occupant enters space.
      b. Switches lights off after predetermined period of vacancy.
      c. Controls lighting in entire space.

5. Integral Vacancy:
   a. Includes pushbuttons for occupant manual on/off and dimming control of lighting in space.
   b. Automatically switches lights off after predetermined period of vacancy.
   c. Includes provision to revert to occupancy control in absence of configurable amount of daylight.
   d. Controls lighting in entire space.

B. Line Voltage Dimming Switches:
   1. Architectural grade, line voltage, 20A rated, single pole, preset style, slide up to brighten and down to dim, with on/off rocker style switch, decora style, wattage rating and lamp/power supply compatibility as required.
   2. Forward Phase, Reverse Phase, 0-10V.
   3. Provide 3-way type where shown on plan.
   4. Lutron Diva Series

C. Wallbox Occupancy Sensor Switches:
   1. 180 degree coverage, type as shown on plan (PIR, ultrasonic or dual-technology), configurable automatic-on or manual on operation, 3-wire type, daylight override, adjustable time-out, selectable walk-through mode and override off switch. Single or dual relay type as required or as shown on Drawings.
   2. Provide 3-way type where shown on plan.
   3. WattStopper PW series.

D. Digital Control Stations:
   1. Provide control stations with configuration as indicated or as required to control the loads as indicated.
   2. General Requirements:
      a. Power: Class 2 (low voltage).
      b. UL listed.
      c. Provide faceplates with concealed mounting hardware, with matching finish.
      d. Borders, logos, and graduations to use laser engraving or silk-screened graphic process that chemically bonds graphics to faceplate, resistant to removal by scratching and cleaning. Self-Adhesive labels not permitted.
      e. Finish: As specified for wall controls in this Section.
   3. Single-Zone or Single-Group:
      a. Turn an individual fixture or group of fixtures as shown on plans on and off via button press.
      b. Raise and lower light levels via press and hold button.
         1) Separate buttons for dimming and on/off functions not allowed.

2.03 RELAYS, SWITCHPACKS AND ROOM CONTROLLERS

A. Analog:
   1. Devices interconnected via low voltage cabling.
   2. Configurable to produce the following sequences of operation by handheld IR or RF remote.
      a. Occupancy control: Automatically turns lights on when occupant is detected in space. Automatically turns lights off after a configurable period of vacancy.
      b. Vacancy Control: Occupant must manually turn lights in space on, automatically turns lights off after a configurable period of vacancy.
      c. Timeclock

B. Digital:
   1. Devices interconnected by contractor terminated cabling.
   2. Configurable to produce the following sequences of operation by handheld IR or RF remote.
      a. Occupancy Control:
         1) Automatically turns lights on when occupant is detected in space.

2) Automatically turns lights off after a configurable period of vacancy.

b. Vacancy Control: Occupant must manually turn lights in space on, automatically turns lights off after a configurable period of vacancy.

c. Timeclock

d. Daylight Harvesting

1) Occupant must manually turn lights in space on, automatically turns lights off after a set period of vacancy.

2) Accepts input from daylight sensing equipment and adjusts light level settings accordingly.

2.04 POWER SUPPLIES AND TRANSFORMERS

A. Provide from same manufacturer of equipment served.

B. Compatible with specified photocells and dimming control station protocols.

C. Refer to Section 26 50 00 - Lighting for product specification on luminaire power supplies and transformers.

2.05 LOW VOLTAGE CONTROL WIRING

A. 18 gauge shielded cable or as recommended by the manufacturer.

2.06 TEST EQUIPMENT

A. Provide multi-function digital illuminance meter with detachable receptor head with the following characteristics:

1. Receptor: Silicon photocell type
2. Illuminance Units: Lux or footcandles (switchable)
3. Measuring range: 0.1 to 19,990 lux, 0.01 to 1,999 footcandles
4. Accuracy: ±4 percent ±1 digit of displayed value
5. Cosine Correction Characteristics: Within ±1 percent at 10 degrees; within ±5 percent at 60 degrees.
6. Measuring functions: Illuminance, integrated illuminance, average illuminance.
7. Temperature/humidity drift: Within ±3 percent ±1 digit (of value displayed at 68 degrees F) within operating temperature/humidity range.
8. Operating conditions: 32 degrees F to 104 degrees F at less than 85 percent humidity.

B. Provide proof of calibration within 12 months of use. Calibration performed by an independent calibration lab approved by the manufacturer of the meter.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Submittal data required prior to ordering and installation.

B. General Testing:

1. Functionally test control devices to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with approved drawings, specifications, and manufacturers' installation instructions.
2. Prepare and complete report of test procedures and results and file with the Owner.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.

G. Provide required supports in accordance with Section 26 05 29.

H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

I. Identify lighting control devices in accordance with Section 26 05 53.

J. Low Voltage Wiring:
   1. Install in conduit where running through inaccessible areas. Provide plenum rated wiring in accessible ceiling spaces.
   2. Test CAT5/6 cables terminated on site prior to wiring of digital lighting control systems. Provide evidence of successful testing to Engineer and Owner. Factory pre-terminated cabling is not subject to this requirement.
   3. Coordinate low voltage wiring connection and location with luminaires to be controlled.

3.02 WORK PRIOR TO COMMISSIONING

A. Complete phases of work so the system can be powered, tested, adjusted, and otherwise commissioned. Under Division 26, Electrical, complete systems, including subsystems, so they are fully functional. This includes the complete installation of equipment, materials, wire, controls, etc., in accordance with the contract documents and related directives, clarifications, change orders, etc.

B. A commissioning plan will be developed by the Test Engineer and approved by the Commissioning Agent. Under Division 26, Electrical, assist the Test Engineer and Commissioning Agent in preparing the commissioning plan by providing necessary information pertaining to the actual equipment and installation. If system modifications and clarifications are in the contractual requirements of this and related sections of work, they will be made at no additional cost to the Owner. If Contractor initiated system changes have been made that alter the commissioning process, the Commissioning Agent will notify the Owner.

C. Specific pre-commissioning responsibilities under Division 26, Electrical are as follows:
   1. Factory startup services for the following items of equipment:
      a. Lighting Control System
   2. Normal startup services required to bring each system into a fully operational state. This includes complete installation and cleaning. The Test Engineer will not begin the commissioning process until each system is documented as being installed complete.

D. Begin commissioning after installation of interior and exterior finishes including but not limited to adjacent roofing, finished floor, wall, and ceiling systems including final painting, furniture and book stacks in place, and other building systems which have direct or indirect influence on the performance and distribution of the daylight and electric lighting systems.

E. Start of commissioning before such items are complete will not relieve Contractor from completing those systems in accordance with the Construction Schedule.

3.03 SEQUENCE OF COMMISSIONING

A. Provide to Architect prior to start of commissioning layout drawings indicating proposed location of measurement points. Proceed with commissioning after review and acceptance by Architect.

B. Illuminance measurements oriented horizontal, facing up, at 30-inches above finished floor. Measurements for a control group occurs at the same location. Ensure constancy of local surface reflectance conditions throughout commissioning of each control group.

C. Ensure no personnel or outside influence affects the amount of flux striking the receptor head during the recording session.

D. Document measurements in clearly understandable format for review by the Architect. Include time of measurement, temperature, and relative humidity.

E. Measure illuminance at least two hours after local sunset with full output of electric lighting. Record integrated illuminance and average illuminance for a 2 hour period.

F. During daylight hours, measure illuminance with electric lighting off, including emergency and nightlight circuits. Record integrated illuminance and average illuminance for a two hour period. Document in clearly understandable format for review by the Architect.

G. Set each photocell to 150 percent of electric-only lighting contribution.

H. After initial setpoint has been set, measure illuminance in 10 minute increments from 1 hour before to 1 hour after local sunset.

I. Submit recorded data to Architect for review.

3.04 TESTING FOR SEASONAL VARIATIONS

A. Timing of Commissioning:
   1. Initial Commissioning:
      a. Perform to best suit the current time-of-year and cloud cover conditions.
      b. Conduct as done as soon as contract work is completed regardless of season.
   2. Seasonal Commissioning: Test under full sunlight and full overcast conditions during summer and winter solstice, as well as similar conditions at the spring or fall equinox.
   3. Subsequent Commissioning: Ascertain adequate performance during the four seasons.

3.05 PARTICIPATION IN COMMISSIONING

A. Provide skilled technicians to start up systems within Division 26, Electrical. The same technicians made available to assist the Test Engineer and Commissioning Agent in completing the commissioning program as it relates to each system and their technical specialty. Work schedules, time required for testing, etc., will be requested, and coordinated by the Test Engineer. Under Division 26, Electrical, ensure that the qualified technician(s) are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments, and problem resolutions at no additional cost to the Owner.

B. System problems and discrepancies may require additional technician time, Test Engineer time, Commissioning Agent time, redesign, and reconstruction of systems and system components. The additional technician time made available for the subsequent commissioning periods until the required system performance is obtained at no additional cost to the Owner.

C. Commissioning Agent reserves the right to judge the appropriateness and qualifications of the technicians relative to each item of equipment or system. Qualifications of technicians include expert knowledge relative to the specific equipment involved, adequate documentation and tools to service the commission the equipment, and a willingness to work with the Test Engineer and Commissioning Agent to get the job done. Remove technicians from the project at the request of either the Test Engineer or Commissioning Agent.

3.06 RESOLUTION OF DEFICIENCIES

A. In some systems, misadjustments, misapplied equipment, and deficient performance will result in additional work required to commission the systems.

B. Complete work under the direction of the Architect, with input from the Contractor, equipment supplier, Test Engineer, and Commissioning Agent.

C. Whereas members will have input and the opportunity to discuss the work and resolve problems, the Architect will have final jurisdiction on the necessary work to be done to achieve performance.

D. Complete corrective work in a timely fashion to permit timely completion of the commissioning process.

E. Experimentation to render system performance is permitted. If the Commissioning Agent deems the experimentation work to be ineffective or untimely as it relates to the commissioning process, the Commissioning Agent will notify the Owner, indicating the nature of the problem, expected steps to be taken, and the deadline for completion of activities.

F. If deadlines pass without resolution of the problem, the Owner reserves the right to obtain supplementary services, equipment, or both, to resolve the problem.

G. Costs incurred to solve the problems in an expeditious manner will be the Contractor's responsibility.

3.07 TRAINING

A. Participate in the training of Owner's engineering and maintenance staff, as required in Divisions 01 through 28, on each system and related components.

B. Conduct training in a classroom setting, with system and component documentation, and suitable classroom training aids.

C. Training classroom sessions and file demonstrations will be videotaped and copies of this material will be provided as part of closeout requirements.

D. Training will be conducted jointly by the test engineer, commissioning agent, the Contractor, and the equipment suppliers.

E. Test engineer responsible for highlighting system peculiarities specific to this project.

3.08 SYSTEMS DOCUMENTATION

A. In addition to the requirements of Division 01, General Requirements, update contract documents to incorporate field changes and revisions to system designs to account for actual constructed configurations.

B. Division 26, Electrical, record drawings include architectural floor plans and the individual daylight control systems in relation to actual building layout.

C. Provide in AutoCAD .dwg format for transmittal to the test engineer.

END OF SECTION

SECTION 26 09 93 - SEQUENCE OF OPERATIONS FOR LIGHTING CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes:
   1. Abbreviations and Definitions
   2. General Controls Approach
   3. Space-by-Space Sequence of Operations

1.02 ABBREVIATIONS AND DEFINITIONS:

A. BACNET: Protocol for integration with BAS/BMS/EMS

B. BAS / BMS / EMS: Building Automated System, Building Management System, Energy Management System

C. D: Dimming Wall Switch

D. FC: Footcandles. The metric for measuring light levels / illuminance levels

E. GUI: Graphic User Interface

F. LCP: Lighting Control Panel

G. LonWorks: Protocol for integration with BAS/BMS/EMS

H. OS/VS: Occupancy Sensor / Vacancy Sensor,
   1. Occupancy sensors provide automatic on and automatic shut-off.
   2. Vacancy sensors provide automatic shut-off only, and require manual-on.

I. RS: RS-232 Connection for AV Integration

J. SC: Scene Control

K. TC: Timeclock, or astronomical timeclock

L. WS: Wall Switch

M. WS/O: Wallbox Occupancy Sensor Switch
   1. Wall Switch with integrated Occupancy Sensor

1.03 SYSTEM DESCRIPTIONS

A. General Controls Approach:
   1. Interior and Exterior lighting loads to be tied to a Networked Modular Relay Control System distributed local to the space.
   2. Lights in the restaurant to be controlled via Centralized Dimming system .

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 SPACE-BY-SPACE SEQUENCE OF OPERATION

A. Example Space Type:

3.02 DESCRIBE THE METHOD FOR TURNING LIGHTS ON AND OFF

A. Examples:
   1. Automatic on/off by timeclock.
   2. Manual on / automatic shut-off by time-clock.
   3. Manual on/off for hazardous location
   4. Automatic on/off by north-facing photocell for dusk-to-dawn operation
   5. Automatic on by north-facing photocell and automatic off by astronomical timeclock at 11pm.

3.03 DESCRIBE LOCAL WALLSTATION(S). ADDRESS EACH LAYER OF LIGHT (AMBIENT, TASK, ACCENT) AS APPLICABLE.

A. Examples:
   1. Switch at entry for local override.

2. Dimmer switch for manual dimming below daylight harvesting set point.
3. Local GUI touchpad with color changing presets at front of room
4. Digital pushbutton switch with on/off and raise lower capability
5. Preset scene control with AV integration for scene recall.

3.04 DESCRIBE ADDITIONAL: DAYLIGHT HARVESTING, SPECIFIC AFTER-HOURS OPERATION, OTHER SPECIAL CONDITIONS FOR THE ROOM'S OPERATION

A. Examples:
   1. Daylight harvesting: Gradual dimming of indicated daylight zones by photocell.
      a. Deadband: 3 min
      b. After-hours:
         1) Occupancy sensor to active egress lights for automatic on/off control for code compliance.
         2) Local override to active normal powered lights with 1 hour shut-off sweep and 5 minute blink warn function.
         3) Constant illumination: When unoccupied lights dim to 25 percent output via occupancy sensor.

B. Exterior Lighting:
   1. Coordinate final timeclock settings for each relay group with Owner for dusk-to-dawn, or dusk-to-evening operation.

C. Back-of-House:
   1. Storage spaces:
      a. Automatic on/off by occupancy sensor with local override.
   2. Electrical:
      a. Rooms where personal safety is a concern to have line voltage switches only.
      b. Provide signage at entry with words, Turn off the Lights, in large contrasting font. Coordinate sign with Architect prior to installation.

D. Other Spaces:
   1. Sequence of operations will be provided upon written request for all spaces not listed. Reprogramming may be required of some spaces on site after installation to tune the system and meet the Owner, daylight and energy management needs. Provide additional programming for reconfiguration up to 24 hours at no additional cost to the Owner or design team.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

C. Section 26 05 29 - Hangers and Supports for Electrical Systems.

D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction.

C. NECA 407 - Standard for Installing and Maintaining Panelboards.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.

F. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum).

G. NEMA PB 1 - Panelboards.

H. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

I. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems.

J. NFPA 70 - National Electrical Code.

K. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations.

L. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations.

M. UL 67 - Panelboards.

N. UL 98 - Enclosed and Dead-Front Switches.

O. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures.

P. UL 869A - Reference Standard for Service Equipment.

Q. UL 943 - Ground-Fault Circuit-Interrupters.

R. UL 1053 - Ground-Fault Sensing and Relaying Equipment.

S. UL 1699 - Arc-Fault Circuit-Interrupters.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.

4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Buy America Act:
1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

1.05 SUBMITTALS

A. See Section 26 05 00 - Common Work Results for Electrical, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.

C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
2. Include wiring diagrams showing all factory and field connections.
3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
4. Include documentation of listed series ratings upon request.

D. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 1 as routine tests.

E. Field Quality Control Test Reports.

F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

H. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Panelboard Keys: Two of each different key.
3. See Section 26 28 13 for requirements for spare fuses and spare fuse cabinets.

J. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature within the following limits during and after installation of panelboards:
   1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
   2. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation

B. General Electric Company

C. Schneider Electric; Square D Products

D. Siemens Industry, Inc

E. Substitutions: See Section 01 60 00 - Product Requirements.

F. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
      b. Panelboards Containing Fusible Switches: Between -22 degrees F and 104 degrees F.

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
   2. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 26 05 73.
   3. Listed series ratings are acceptable only where specifically indicated.
   4. Label equipment utilizing series ratings as required by NFPA 70.

D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.

1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
2. Provide 200 percent rated neutral bus and lugs where indicated, where oversized neutral conductors are provided, or where panelboards are fed from K-rated transformers.
3. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
4. Provide separate isolated/insulated ground bus where indicated or where isolated grounding conductors are provided.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
      b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
      c. Provide removable end walls for NEMA Type 1 enclosures.
      d. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
   3. Fronts:
      a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
      b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
      c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
   4. Lockable Doors: All locks keyed alike unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

K. Panelboard Contactors: Where panelboard contactors are indicated, provide electrically operated, mechanically held magnetic contactor complying with NEMA ICS 2.
   1. Ampere Rating: Not less than ampere rating of panelboard bus.
   2. Short Circuit Current Rating: Not less than the panelboard short circuit current rating.
   3. Coil Voltage: As required for connection to control system indicated.

L. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
   1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
   2. Where accessory ground fault sensing and relaying equipment is used, equip companion overcurrent protective devices with ground-fault shunt trips.
      a. Use zero sequence ground fault detection method unless otherwise indicated.
      b. Provide test panel and field-adjustable ground fault pick-up and delay settings.
      c. Provide zone selective interlocking capability where indicated, capable of communicating with other electronic trip circuit breakers and external ground fault sensing systems to control ground fault delay functions for system coordination purposes.

M. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

N. Multi-Section Panelboards: Provide enclosures of the same height, with feed-through lugs or sub-feed lugs and feeders as indicated or as required to interconnect sections.

O. Load centers are not acceptable.

P. Provide the following features and accessories where indicated or where required to complete installation:
   1. Feed-through lugs.
   2. Sub-feed lugs.

Q. Metering:
   1. Where indicated on Design Drawings, provide microprocessor-based digital electrical metering system including instrument transformers, wiring, and connections necessary for measurements specified.
   2. Metering type to be as indicated on Design Drawings
      a. See Section 26 27 13 for metering equipment requirements.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase and Neutral Bus Material: Aluminum or copper.
   2. Ground Bus Material: Aluminum or copper.

D. Circuit Breakers:
   1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
   2. Provide thermal magnetic circuit breakers unless otherwise indicated.
   3. Provide electronic trip circuit breakers where indicated.

E. Circuit Breaker Selection for Transformer Primary Protection: Provide circuit breakers with time-current characteristics to clear transformer inrush currents while still providing protection for the ANSI through-fault protection curve. Provide circuit breakers with adjustable magnetic trip or electronic trip units as necessary to provide time-current curve shaping to achieve long time trip indicated on drawings, inrush coordination and damage protection.

F. Enclosures:
   1. Provide surface-mounted enclosures unless otherwise indicated.
   2. Fronts: Provide trims to cover access to load terminals, wiring gutters, and other live parts, with exposed access to overcurrent protective device handles.
   3. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
   4. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
   5. Provide clear plastic circuit directory holder mounted on inside of door.

G. Metering:
   1. Where indicated on Design Drawings, provide microprocessor-based digital electrical metering system including instrument transformers, wiring, and connections necessary for measurements specified.
   2. Metering type to be as indicated on Design Drawings
      a. See Section 26 27 13 for metering equipment requirements.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:

1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
2. Phase and Neutral Bus Material: Aluminum or copper.
3. Ground Bus Material: Aluminum or copper.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.
2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
3. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
4. Provide clear plastic circuit directory holder mounted on inside of door.

F. Provide column-width panelboards with accessory column-width cable trough and pullbox where indicated.

G. Metering:
1. Where indicated on Design Drawings, provide microprocessor-based digital electrical metering system including instrument transformers, wiring, and connections necessary for measurements specified.
2. Metering type to be as indicated on Design Drawings
   a. See Section 26 27 13 for metering equipment requirements.

2.05 OVERCURRENT PROTECTIVE DEVICES

A. Fusible Switches:
1. Description: Quick-make, quick-break, dead-front fusible switch units complying with NEMA KS 1, and listed and labeled as complying with UL 98; ratings, configurations, and features as indicated on the drawings.
2. Fuse Clips: As required to accept indicated fuses.
   a. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
3. Provide externally operable handle with means for locking in the OFF position. Provide means for locking switch cover in the closed position. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
4. Conductor Terminations:
   a. Provide mechanical lugs unless otherwise indicated.
   b. Provide compression lugs where indicated.
   c. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

B. Molded Case Circuit Breakers:
1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
   a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
   b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   c. Series Rated Systems: Provide circuit breakers listed in combination with upstream devices to provide interrupting rating not less than the short circuit current rating indicated. Acceptable only where specifically indicated.

3. Conductor Terminations:
   a. Provide mechanical lugs unless otherwise indicated.
   b. Provide compression lugs where indicated.
   c. Lug Material: Copper, suitable for terminating copper conductors only.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   a. Provide interchangeable trip units where indicated.
5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
   a. Provide zone selective interlocking capability where indicated, capable of communicating with other electronic trip circuit breakers and external ground fault sensing systems to control short time delay and ground fault delay functions for system coordination purposes.
   b. Provide communication capability where indicated: Compatible with system indicated.
6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
7. Provide the following circuit breaker types where indicated:
   a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
   b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
   c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
   d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
   e. Current Limiting Circuit Breakers: Without using fusible elements, designed to limit the let-through energy to a value less than the energy of a one-half cycle wave of the symmetrical prospective current when operating within its current limiting range.
   f. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.
   g. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
8. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.
9. Provide listed high intensity discharge lighting rated circuit breakers with HID marking for all branch circuits serving HID lighting.
10. Do not use tandem circuit breakers.
11. Do not use handle ties in lieu of multi-pole circuit breakers.
12. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
13. Provide the following features and accessories where indicated or where required to complete installation:
   a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
   b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.
   c. Auxiliary Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped or been turned off.
   d. Undervoltage Release: For tripping circuit breaker upon predetermined drop in coil voltage with field-adjustable time delay to prevent nuisance tripping.
   e. Alarm Switch: SPDT switch suitable for connection to system indicated for indicating when circuit breaker has tripped.

2.06 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Factory test panelboards according to NEMA PB 1.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

I. Mount floor-mounted power distribution panelboards on properly sized 3 inch high concrete pad constructed in accordance with Section 03 30 00.

J. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

K. Provide grounding and bonding in accordance with Section 26 05 26.
   1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.
   2. Terminate branch circuit isolated grounding conductors on isolated/insulated ground bus only. Do not terminate on solidly bonded equipment ground bus.

L. Install all field-installed branch devices, components, and accessories.

M. Provide fuses complying with Section 26 28 13 for fusible switches as indicated.

N. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

O. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.

P. Set field-adjustable circuit breaker tripping function settings as indicated.

Q. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed according to Section 26 05 73.

R. Set field-adjustable ground fault protection pickup and time delay settings as indicated.

S. Provide filler plates to cover unused spaces in panelboards.

T. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads as directed.

U. Identify panelboards in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Fusible Switches: Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

D. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.
   1. Perform insulation-resistance tests on all control wiring with respect to ground.
   2. Test functions of the trip unit by means of secondary injection.

E. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
   1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.

F. Test GFCI circuit breakers to verify proper operation.

G. Test AFCI circuit breakers to verify proper operation.

H. Test shunt trips to verify proper operation.

I. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.

J. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Floor box service fittings.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 26 05 33.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices.

E. NEMA WD 1 - General Color Requirements for Wiring Devices.

F. NEMA WD 6 - Wiring Devices - Dimensional Specifications.

G. NFPA 70 - National Electrical Code.

H. UL 20 - General-Use Snap Switches.

I. UL 498 - Attachment Plugs and Receptacles.

J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices.

K. UL 943 - Ground-Fault Circuit-Interrupters.

1.04 SUBMITTALS

A. See Section 26 05 00 - Common Work Results for Electrical for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

C. Operation and Maintenance Data:
   1. GFCI Receptacles: Include information on status indicators.

D. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

1.05 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

1.07 ADMINISTRATIVE REQUIREMENTS

A. Buy America Act:
   1. This specification section contains products that are required to comply with Federal Build America, Buy America Act 117-58; 70901-52 requirements. The contractor shall review the requirements of this Act and provide products that comply for areas of the project where Buy America compliance is required. In addition to providing the products and materials, the Contractor shall provide Certificates of Materials Origin (CMO) submittal for each product required to comply prior to procuring the materials.

PART 2 - PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

2.02 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: Gray with stainless steel wall plate.

2.03 WALL SWITCHES

A. Manufacturers:
   1. Hubbell Incorporated.
   2. Leviton Manufacturing Company, Inc.
   3. Pass & Seymour, a brand of Legrand North America, Inc.

B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 RECEPTACLES

A. Manufacturers:
   1. Hubbell Incorporated.
   2. Leviton Manufacturing Company, Inc.
   3. Lutron Electronics Company, Inc; Designer Style.
   4. Pass & Seymour, a brand of Legrand North America, Inc

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
   2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

E. Exposed Device Color, unless otherwise noted, is as follows:
1. Normal power: Gray or as selected by Architect.

2.05 WALL PLATES

A. Manufacturers:
1. Hubbell Incorporated.
2. Leviton Manufacturing Company, Inc.
3. Lutron Electronics Company, Inc.
4. Pass & Seymour, a brand of Legrand North America, Inc.

B. Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
2. Size: Standard.
3. Screws: Metal with slotted heads finished to match wall plate finish.

C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

D. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

2.06 FLOOR BOX SERVICE FITTINGS

A. Manufacturers:
1. Hubbell Incorporated.
2. Thomas & Betts Corporation.
3. Wiremold, a brand of Legrand North America, Inc.

B. Description: Refer to floor box schedule on drawings for device description.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.
   1. ocate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Owner to obtain direction prior to proceeding with work.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.

J. Install wiring devices plumb and level with mounting yoke held rigidly in place.

K. Install wall switches with OFF position down.

L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each wiring device for damage and defects.

C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.

D. Test each receptacle to verify operation and proper polarity. Receptacle testing report form example is as follows:

E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 50 00 - LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes:
   1. Lenses
   2. Reflector Cones
   3. Housings
   4. Finish
   5. Suspension
   6. Lamps and Sockets
   7. Power Supplies
   8. Transformers
   9. Exterior Luminaires
   10. Extra Material
   11. Disposal and Replacement

1.02 DEFINITIONS

A. BACNET Protocol for integration with BAS/BMS/EMS

B. BAS Building Automation System,

C. BMS Building Management System

D. EMS

E. CCT Correlated Color Temperature

F. CRI Color Rendering Index

G. CS Control Station

H. D Dimming Wall Switch

I. DT Dual Technology (PIR + U)

J. FC Footcandles
   1. The metric for measuring illuminance light levels
   2. GUI Graphic User Interface
   3. LCP Lighting Control Panel
   4. LED Light Emitting Diode
   5. LonWorks Protocol for integration with BAS/BMS/EMS
   6. MTBF Minimum Time Between Failures
      a. Total hours of testing / Number of failures
   7. OS/VS Occupancy Sensor / Vacancy Sensor,
      a. Occupancy sensors provide automatic on and automatic shut-off.
      b. Vacancy sensors provide automatic shut-off only, and require manual-on.
   8. PC Photocell
   9. PIR Passive Infrared Technology
   10. Power Supply Ballasts and LED drivers
   11. RS RS-232 Connection for AV Integration
   12. SC Scene Control
   13. TC Timeclock, or astronomical timeclock
   14. U Ultrasonic Technology
   15. WS Wall Switch
   16. WS/O Wallbox Occupancy Sensor Switch
      a. Wall Switch with integrated Occupancy Sensor

1.03 RELATED SECTION

A. Section 01 35 70 – Buy America Certification Procedures

1.04 REFERENCE STANDARDS

A. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements.

B. ANSI E1.11 - Entertainment Technology - USITT DMX512-A - Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories.

C. ANSI E1.20 - Entertainment Technology - RDM - Remote Device Management over USITT DMX512 Networks.

D. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

E. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code).

F. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements.

G. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products.

H. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules.

I. NFPA 70 - National Electrical Code.

J. TIA-485 - Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems.

1.05 QUALITY ASSURANCE

A. The lighting design for this project was based on luminaire types and manufacturers as specified.

B. Basis of Design manufacturers are pre-qualified to bid on products where specified. Inclusion of manufacturer and product series does not relieve specified manufacturer from providing product as described in luminaire schedule; modifications to standard product, if required, include with initial bid.

C. Alternate manufacturers listed in the Luminaire Schedule do not require prior approval but included with the shop drawing submittal. Inclusion of manufacturer and product series as an alternate does not relieve the manufacturer from providing product equivalent to the basis of design as described in luminaire schedule; modifications to standard product, if required, include with initial bid.

D. Or Approved or Pre-Bid Approved Equal:
   1. Submit Substitution Request prior to bid, complying with requirements of Division 01, General Requirements.
   2. Approval determined by review of the following luminaire characteristics where applicable. Lack of pertinent data on characteristic constitutes justification for rejection of the submittal.
      a. Performance:
         1) Distribution
         2) Utilization
         3) Average brightness/maximum brightness.
         4) Spacing to mounting height ratio.
         5) Visual comfort probability.
      b. Construction:
         1) Engineering
         2) Workmanship
         3) Rigidity
         4) Permanence of materials and finishes.
      c. Installation Ease:
         1) Captive parts and captive hardware.
         2) Provision for leveling.

3) Through-wiring ease.

d. Maintenance:
   1) Relamping ease.
   2) Ease of replacement of ballast and lamp sockets.

e. Appearance:
   1) Architectural integration.
   2) Light tightness.
   3) Neat, trim styling.
   4) Conformance with design intent.

1.06 GENERAL REQUIREMENTS

A. Provide lighting outlets indicated on the Drawings with a luminaire of the type designated and appropriate for the location.

B. Where a luminaire type designation has been omitted and cannot be determined by the Contractor, request a clarification from the Architect in writing and provide a suitable luminaire type as directed.

C. Coordinate installation of luminaires with the ceiling installation and other trades to provide a total system that is neat and orderly in appearance.

D. Luminaires located in fire rated assemblies rated for use in such assemblies or have assembly maintained by the installer through the use of appropriate construction techniques to maintain the assembly rating. It is the responsibility of the Contractor to maintain the assembly rating and provide required components during construction. Coordinate luminaires impacted with Division 01, General Requirements, and life safety documents.

E. Install remote power supplies and transformers in enclosures as required by luminaire specified. Locate remote power supplies and transformers as shown on drawings; where no location is shown, provide recommendation for approval prior to commencing field installation. Locate remote mounted power supplies and transformers within the distance limitations specified by the manufacturer.

F. Exterior pole lights have an appropriated pole base as part of the assembly. For pole lights in pedestrian areas, use a flush pole base. Pole lights in parking areas a raised base used. Pole bases, footings, and structural components reviewed and approved by a state licensed structural engineer prior to ordering and installation.

G. Linear lighting elements installed on building exterior, in coves, soffits, panels and other architectural materials are the longest sections available to meet the intent of the design and centered in the available space. Other items required to make the lights function installed out of site and coordinated with Architect, Landscape Architect, Lighting Designer, and Electrical Engineer of Record. Transformers, drivers, and ballasts in suitable enclosures. Required connection points are the minimum box or connector available from the manufacturer. Standard electrical boxes are not allowed to produce linear runs in architectural coves. Ancillary material required is concealed from view. Coordinate final ceiling material, dimensions, and limitations with the ceiling manufacturer prior to ordering and installation.

H. Coordinate voltage requirements to each luminaire as indicated on drawings.

I. Verify luminaires carry a valid UL or ETL listing. Luminaires located in outdoor locations to carry and appropriate wet or damp listing as required for the mounting application.

J. Procure luminaires through a distributor located within 200 miles of the project site with a valid business license in the state the project is located.

K. Upon request of the Architect, Engineer, or Owner, provide back-up pricing in a unit cost breakdown per luminaire. Back-up pricing includes distributor net pricing, Contractor net pricing, final Owner pricing and mark-ups and discounts (lot price or all-or-none) associated with the luminaires.

L. Lighting related change orders to include back-up pricing noted above for review by the Engineer and Lighting Designer.

M. Provide manufacturer's warranty covering 5 years on drivers from date of purchase. Luminaire manufacture to operate driver at or below the required driver warranty temperature. Luminaire manufacturers failing to operate the driver, at the project required ambient temperature and within the driver manufacturer warranty parameters will be responsible for driver warranty related costs over the warranty period.

N. 80 percent of the luminaire material by weight at a minimum should be recyclable at end of life. Design luminaire for ease of component replacement and end-of-life disassembly.

1.07 SUBMITTALS

A. Submit the following in accordance with Section 26 05 00 - Common Work Results for Electrical:
   1. Shop Drawings, to include:
      a. Product Data.
         1) Provide manufacturer's published product data information.
         2) This information is to be relevant to the specified product only.
         3) Submittals limited to not more than three sheets for each type specified.
         4) They are specifically not to have configurations available included for review.
         5) Submittals that contain information that is not relevant to the product specified will be rejected in total and resubmission will be required.
      b. Luminaire dimensions on a fully dimensioned line drawing.
      c. Lamp information, including array configuration:
         1) For LED lamps: proof of conformance with the following: ANSI C78.377-2015, IES LM-79-2008, IES LM-80-2008, IES LM 82-2012, IES LM 84-14, IES LM 85-14, IES TM 21-2011, IES TM 28-14 and special certifications required by the contract documents.
      d. Lamp socket information.
      e. Power supply and transformer information using ballast manufacturers published product data information. Multiple power supplies or transformers may be submitted for single luminaire if compatible with specification included in contract documents. Include certification of lamp and power supply and transformer compatibility for submitted.
      f. Mounting details including clips, canopies, supports, and methods for attachment to structure. Provide equipment required for row configurations.
      g. UL/ETL Labeling Information
      h. Manufacturer's Warranty
      i. Photometric Reports consisting of the following:
         1) Candlepower distribution curves: Provide five plane candlepower distribution data at no more than 5 degree vertical angle increments.
         2) Coefficient of utilization table.
         3) Zonal lumen summary including overall luminaire efficiency.
         4) Luminaire luminance: Provide measured maximum brightness data for luminaires with reflectors and average brightness data for luminaires with refractors.
         5) Spacing to mounting height ratio. If parallel and perpendicular ratios differ, provide data on each plane.
         6) Pole information to include maximum supported effective projected area (EPA) and weight for the design wind speed, as well as structural calculations for each pole proposed.
         7) VCP calculations (where applicable): For general office lighting luminaires, provide typical VCP calculations for ceiling heights between 9-feet and 12-feet at 1-foot increments, for room sizes 20-feet by 20-feet and 30-feet by 30-feet.
      j. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

2. Operation and Maintenance Data:
   a. Prepare two copies of a Lighting Systems Maintenance Manual consisting of the following in a hard-cover binder for review. After review, Architect will deliver one copy to Owner. Manual to include:
      1) One complete set of final submittals of actual product installed, including product data and shop drawings. Include product data for actual power supply and transformer installed where applicable.
      2) List of lamps used in Project, cross-referenced to fixture types, with specific manufacturer's names and ordering codes.
      3) Re-lamping instructions for lamps that require special precautions (LED, tungsten halogen, metal halide, etc.).
      4) Lighting fixture cleaning instruction, including chemicals to be used or avoided.
      5) Parts list of major luminaire components and ordering information for replacement
      6) Copies of manufacturer warranties on product.
3. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires to be installed and comply with designated structural design criteria.
4. Manufacturer's Installation Instructions:
   a. Indicate application conditions and limitations of use stipulated by product testing agency.
   b. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
5. Closeout Submittals:
   a. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.
   b. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
   c. Maintenance Materials: Furnish for Owner's use in maintenance of project.

PART 2 - PRODUCTS

2.01 GENERAL

A. Luminaires new and complete with mounting accessories, junction boxes, trims, and lamps.

B. Luminaire assemblies UL listed.

C. Luminaires UL listed appropriate to mounting conditions and application.

D. Each luminaire family type (downlights, troffers, etc.) supplied by only one manufacturer.

E. Install recessed luminaires in fire rated ceilings and use a fire rated protective cover thermally protected for this application and carry a fire rated listing.

F. Luminaires installed under canopies, roofs, or open areas and similar damp or wet locations to be UL listed and labeled as suitable for damp or wet locations.

2.02 LENSES

A. Mechanically secured from within the housing.

B. Interior linear prisms with smooth exterior.

C. Prismatic Acrylic:
   1. 12-inch by 24-inches and Larger: Extruded of clear virgin acrylic plastic, 0.125-inch minimum overall thickness, 0.1-inch nominal unpenetrated thickness, Pattern 12 with flat sided female prisms running at 45 degrees off panel axis unless otherwise specified in the luminaire schedule. Concave prisms are not acceptable.
   2. 12-inch by 24-inches and Larger: Low brightness type, extruded of clear virgin acrylic plastic, 0.156-inch minimum overall thickness, 0.1-inch nominal unpenetrated thickness, Pattern 19 with flat sided male prisms running parallel with panel axis unless otherwise specified in the luminaire schedule. Concave prisms are not acceptable.

3. 12-inch by 24-inch and Larger: Injection molded of clear virgin acrylic plastic, 0.16-inch minimum overall thickness with 0.125-inch nominal unpenetrated thickness square cone base, similar to Pattern 12 configuration.
4. As specified in the Luminaire Schedule.

D. Opal Acrylic:
1. Extruded or injection molded of virgin acrylic plastic, 0.08-inch minimum overall thickness.
2. As specified in the Luminaire Schedule.

E. Opal Acrylic Overlay: High transmittance type, extruded of virgin acrylic plastic, 0.04-inch overall thickness, with minimum 80 percent light transmittance.

2.03 HOUSINGS

A. Dimensions:
1. Proper for the various wattage noted on the plans and as recommended by the luminaire manufacturer or as specified in the luminaire schedule.

B. Extruded Aluminum Housing:
1. One piece housing of AA 6063 T5 extruded aluminum with 0.14 minimum thickness smooth and free of tooling lines in one uninterrupted section of 1-foot to 24-foot with the cross sectional dimensions as indicated in the Luminaire Schedule.
2. Section lengths as shown on the drawings and able to be transported into and out of the installation location after final construction without building demolition being required.

C. Steel Housing:
1. 20 gauge minimum, free of dents, scratches, or other defects.
2. Fill and sand exposed weld marks, joints, and seams smooth before finishing. Clean and dress edges to remove sharp edges or burrs.
3. Section lengths as shown on the drawings comprised of 1-foot to 12-foot lengths.

D. Sheet Metal Housings:
1. Minimum 22 gauge cold-rolled steel, with welded joints. Exposed weld marks and seams filled and ground smooth.

E. Door Frames for lensed luminaires:
1. White painted, flat aluminum with mitered corners, rotary cam latches to hinge from either side.

F. End Plates:
1. Mechanical attach die cast end plates without exposed fasteners. End caps, minimum 0.125-inch thick.

G. Provide an internal alignment spline where housing sections are joined together to form a continuous row.

H. Recessed Luminaires
1. Rated for use in recessed applications.
2. If required by the Owner or design team, the manufacturer must produce test data proving the product is rated for use in recessed applications.
3. Equip with through wire junction box. Box, power supply, and replaceable components accessible from the ceiling opening of the luminaire.

I. Luminaires used as air-handling registers for HVAC systems meet the requirements of NFPA 90A.

J. For wet and damp use, LED-based luminaire to be sealed, rated, and tested for appropriate environmental conditions and may not be accomplished by using an additional housing or enclosure

2.04 FINISH

A. Visible surfaces to be of color and texture as directed in Luminaire Schedule.
1. Baked white dry polyester powder, if not specified, with a minimum average reflectance of 85 percent on exposed and light reflecting surfaces.

B. Concealed interior and exterior luminaire surfaces to be Matte black or as recommended by the luminaire manufacturer.

C. Prepare steel components for finishing with a 5-step zinc phosphating process prior to painting.

D. Paint luminaire (including painted component parts) after fabrication unless specifically noted in the Luminaire Schedule.

E. Exposed aluminum surfaces:
   1. Satin etched and clear anodized.
   2. Treat with an acid wash and clear water rinse prior to painting.
   3. Electrostatically paint or powder coat and oven bake in the color indicated in the Luminaire Schedule.

F. Exposed steel surfaces:
   1. Treat with acid wash and clear water rinse, then prime coat.
   2. Electrostatically paint or powder coat and oven bake in the color indicated in the Luminaire Schedule.

2.05 SUSPENSION

A. Suspension Devices, type as specified in the Luminaire Schedule:
   1. Aircraft Cable:
      a. Stainless steel type - 3/32-inch nominal diameter, stranded, with positive pressure, field adjustable clamp at fixture connection.
   2. Rigid Pendant:
      a. 1/2-inch nominal diameter or as specifically shown on drawings.
      b. Supplied by fixture manufacturer when available as standard product.
      c. At fixture end of stems, provide earthquake type swivel fitting to permit 45 degree swing in any direction away from vertical.
      d. Flat canopy to permit splice inspection after installation.
   3. Chain Hangers:
      a. Length to suit fixture mounting height if shown or as field conditions dictate.
      b. Use two heavy duty chains with S hooks at each suspension point.
      c. Length to suit mounting height as shown on Drawings.
   4. Suspension system must permit ±1/2-inch minimum vertical adjustment after installation.

B. Supports:
   1. Provide internal safety cable from fixture body to structure.
   2. Carry fixture weight to structure and provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting. Provide diagonal seismic restraint wires per code.

C. Feed Point:
   1. Flat-plate canopy to cover outlet box, with holes for support cable and power cord, concealed fasteners to permit splice inspection after installation.
   2. At the electrified connection provide straight cord feed. Provide a separate feed point where emergency feed is required.
   3. Power Cord:
      a. White multi-conductor cord, parallel to support cable (aircraft cable); within pendant (rigid pendant); or flexible conduit (chain hanger).
   4. Provide a separate fee point where emergency feed is required.

D. Non-feed Points:
   1. 1/2-inch OD polished chrome end sleeve, inside threaded 1/4-inch-20, with 2 -inch diameter. Flat white plate to cover hole in ceiling. Top of cable with ball swaged on end, to fit inside sleeve.
   2. Provide support above ceiling as required.

E. Suspension method allows adjustment to be made in hanging length to allow for variance in ceiling height.

F. Exposed paintable suspension components have the same finish and color as the luminaire housing.

2.06 LAMPS AND SOCKETS

A. Lamp each luminaire with the suitable lamp cataloged for the specific luminaire type and as indicated by the manufacturer, or as specifically indicated in the Luminaire Schedule, or as specified herein.

B. Lamps to be field replaceable.

C. Lamp sockets to be of configuration and design to accept standard LED lamps and circuit boards.

D. LED lamps to meet or exceed 50,000 hours as defined by LM-80-08 based on both the ambient temperature listed and the LEDs B10L70 performance curve as published by the LED lamp manufacturer.

E. LED lamps to be high brightness and proven quality from established and reputable LED manufacturers, including:
   1. Nichia
   2. Osram-SemiOpto
   3. Cree
   4. Philips Lumileds
   5. Seoul Semiconductor
   6. Bridgelux
   7. General Electric Gelcore
   8. Xicato
   9. Osram

F. Replacement Lamps
   1. Sorra
   2. Toshiba

G. LED lamps that are integral into the housing; light bars, diodes, boards and other, to be rated and tested for use in the fixture specified and compatible with the driver tested and compatible with that fixture.

H. Color Rendering Index (CRI):
   1. 80 or higher for ambient lighting in common spaces
   2. 90 or higher for accent lighting in common spaces
   3. 95 or higher for art lighting
   4. As indicated in the luminaire schedule

I. Color Rendering Index (CRI): 90+ per ANSI C78.377-2008/CIE 13.3-1995 unless noted otherwise on the luminaire schedule.

J. Correlated Color Temperature (CCT) per luminaire schedule.
   1. Color consistency not to exceed a +/- tolerance of greater than two MacAdam Ellipses over the life of the luminaire.

K. Adjustable Lamp Mechanisms: To have aiming stops which can be permanently set to position lamp vertically and rotationally.

L. High power LED luminaire thermally protected using one or more of the following thermal management techniques: metal core board, gap pad, and/or internal monitoring firmware

M. Operating Temperature: -22 degrees F to 115 degrees F.
   1. Operate below manufacturer's published die junction temperatures when operated at 1W at 350 mA in an elevated ambient of 46 degrees C.

N. Utilize quick-connect connections to replaceable boards to meet ANSI and UL/ETL and NEMA requirements.

2.07 POWER SUPPLIES

A. UL recognized under the component program and modular for simple field replacement.

B. Rate for use with the LED array specified.
   1. Warranty array and driver as an assembly.
   2. 5 year full replacement, non-pro-rated warranty is required on electronic components.

C. Luminaires requiring more than one driver are not permitted, unless specified in the luminaire schedule.

D. Power supplies used in enclosed and gasketed luminaires listed for use in wet locations, Type 1 construction.

E. Rate for the expected ambient temperature in which they are installed.
   1. Exterior installed power supplies rated to start the lamps at 0 degrees F.

F. Operate for a (+/- 10 percent) supply voltage of 120V through 277VAC at 60Hz.

G. Power Factor: 0.9 minimum

H. Lifetime minimum
   1. 50,000 hours at full load and 77 degrees F ambient
   2. Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.

I. Minimum time between failures (MTBF) greater than 300,000 hours at full load and 77 degrees F ambient, in accordance with MIL-HDBK-217.

J. Driver and luminaire electronics deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10).
   1. Flicker index to be less than 5 percent at frequencies below 1000 Hz.

K. Label systems using tandem wired luminaires be labeled accordingly. Locate label in the lamp compartment of each luminaire and identify the function of that luminaire. Do not make the label visible from room.

L. Total Harmonic Distortion less than 20 percent and meet ANSI C82.11 maximum allowable THD requirements at full output. At no point in the dimming curve allow imbalance current to exceed full output THD.

M. Withstand up to a 1,000V surge without impairment of performance as defined by ANSI C62.41 Category A.

N. Housing have circuit diagrams and lamp connections applied thereto.

O. Must be Reduction of Hazardous Substances (RoHS) compliant

P. Provide no light output when the analog control signal drops below 0.5 V, or the DALI/DMX digital signal calls for light to be extinguished and consume 0.5 watts or less in this standby. Control deadband between 0.5V and 0.65V included to allow for voltage variation of incoming signal without causing noticeable variation in fixture to fixture output.

Q. Support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance:
   1. Adjustment of forward LED voltage, supporting 3V through 55V.
   2. Adjustment of LED current from 200mA to 1.05A at the 100 percent control input point in increments of 1mA
   3. Adjustment for operating hours to maintain constant lumens (within 5 percent) over the 50,000 hour design life of the system, and deliver up to 20 percent energy savings early in the life cycle.

R. Remote: Driver may be remote mounted up to 300-feet depending on power level and wire gauge.

S. Dimming Drivers:
   1. Dimming power supplies controlled by a common controller provided by the same manufacturer.

2. Manufacturer to have minimum 5 years' experience in manufacturing of dimmable electronic lighting drivers.
3. LED dimming to be equal in range and quality to a commercial grade incandescent dimmer. Quality of dimming to be defined by dimming range, freedom from perceived flicker or visible stroboscopic flicker, smooth and continuous change in level (no visible steps in transitions), natural square law response to control input, and stable when input voltage conditions fluctuate over what is typically experience in a commercial environment.
    a. Demonstration of this compliance to dimming performance will be necessary for substitutions or prior approval.
4. Provide step-free, continuous dimming to black from 100 percent to 0.1 percent and 0 percent relative light output, or 100 - 1 percent light output and step to 0 percent where indicated. Driver responds similarly when raising from 0 percent to 100 percent.
    a. Driver to be capable of 20 bit dimming resolution for white light LED drivers or 15 bit resolution for RGBW LED drivers.
5. Track evenly across multiple fixtures at light levels, and provide input signal to output light level that allow smooth adjustment over the entire dimming range.
6. Limit inrush current.
7. No visible change in light output with a variation of plus/minus 10 percent line voltage input.
8. Ability to configure a linear or logarithmic dimming curve, allowing fine grained resolution at low light levels
9. Basis of Design Product: eldoLED or subject to compliance and prior approval with specified requirements of this section, one of the following:
    a. eldoLED
    b. Philips
    c. Osram Sylvania
    d. Tridonic
    e. General Electric
10. Dimming Protocols:
    a. If not otherwise noted on the luminaire schedule, dimming LED drivers to be 0-10V.
    b. 4-Wire (0-10V DC Voltage Controlled) Dimming Drivers
        1) Must meet IEC 60929 Annex E for General White Lighting LED drivers
        2) Connect to devices compatible with 0 to 10V Analog Control Protocol, Class 2, capable of sinking 0.6 ma per driver at a low end of 0.3V. Limit the number of drivers on each 0-10V control output based on voltage drop and control capacity.
        3) Must meet ESTA E1.3 for RGBW LED drivers
        4) 0-10V input protected from line voltage miswire, and immune and output unresponsive to induced AC voltage on the control leads.
    c. Digital (DALI Low Voltage Controlled) Dimming Drivers
        1) Must meet IEC 62386
    d. Digital Multiplex (DMX Low Voltage Controlled) Dimming Drivers
        1) Must meet DMX / RDM: ANSI/TIA-485, ANSI E1.11 - USITT DMX512A and ANSI E1.20 (Explore and Address)
        2) Capable of signal interpolation and smoothing of color and intensity transitions.
        3) Luminaires requiring more than one driver are not permitted.
        4) Drivers may be connected to the DMX bus by a T-tap spur not to exceed 12-inch in absolute length. In other cases, a DMX input and output connection must be provided.
    e. As indicated in the luminaire schedule.

2.08 TRANSFORMERS

A. Provide proper lamp voltage to low voltage lamps.
   1. Integral:
      a. Magnetic: Encapsulated for silent operation, securely mounted to the luminaire and removable through the aperture for hard ceiling installations or remote where shown on drawings.
      b. Electronic: Do not provide electronic transformers unless directed in the Luminaire Schedule.
   2. Remote:
      a. Magnetic:
         1) Encapsulated for silent operation, securely mounted accessible in location shown on drawings.
         2) Provide code-sized primary and secondary circuit protection via fuses, quantity of secondary circuits as required to serve specified load.
      b. Electronic:
         1) Do not provide electronic transformers unless directed in the Luminaire Schedule.

2.09 EXTERIOR LUMINAIRES

A. Label fixtures from the factory for use in the designed installation. It is the responsibility of the Contractor to verify labeling and installation requirements with the NEC and applicable codes and standards.
   1. External Label: ANSI C136.15
   2. Luminaires must have locality-appropriate governing mark and certification.

B. The luminaire must be subjected to 100,000 cycles of 2 Gs at the resonant frequency of the luminaire (between 5 and 30 Hz) applied at the center of gravity of the luminaire on three primary axes per ANSI C136.31 without damage to the luminaire. Fully functional luminaire upon completing the test.

C. Luminaire must be IP and/or UL-listed for damp or wet locations, as appropriate for exterior application, and wiring cavity must be field accessible for service or repair needs.

D. Provide luminaires fully assembled and electrically tested before shipment from factory.

E. Optical cavity must be a minimum IEC 60529/IP65.

F. Rate luminaires for -4 degrees F to 104 degrees F operation.

G. The coating must be capable of surviving ASTM B117 Salt Fog environment for 500 hour minimum without blistering or peeling. The coating must demonstrate gloss retention of greater than or equal to 90 percent for 500 hour exposure QUV test per ASTM G53 UVB313, 4 hour UV-B 140 degrees F/4 hour condensation 122 degrees F.

H. Provide luminaires with a NEMA distribution pattern as indicated in the luminaire schedule.

I. Water feature and fountain lighting to meet applicable codes and regulations.

J. Project Conditions Coordination:
   1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under Work of Other Sections, or by others.
   2. Coordinate elevation to obtain specified foundation height.
   3. Notify Owner of conflicts or deviations; obtain direction prior to proceeding with Work.

K. Exterior Lenses
   1. In-grade lenses drive-over and cool touch rated
   2. For lenses not integral to the LED lamp, construct the luminaire optical enclosure (lens/window) of clear and UV-resistant polycarbonate, acrylic, or glass.

L. Unless otherwise indicated, provide cast-in-place embedded style concrete foundations with constructed forms for square foundations or round foundations with spirally wrapped treated paper forms. Provide concrete, anchor bolts, and reinforcing steel as indicated in the Drawings.

M. Poles:
1. Provide poles of material and form as indicated in the luminaire schedule. Provide poles able to withstand winds of not less than 100 mph and a gust factor of 1.3 with an ice load criteria up to 1/2-inch thick without damage to the pole and attached luminaire.
2. Provide poles with a hand-hole and removable hand-hole coverplate that matches the material and finish of the pole. Install covers with vandal resistant bolts. Locate hand-hole located approximately 18-inches above the pole base.
3. Provide poles with provisions for installation of Owner provided and installed security cameras. Provide hand-hole with removable hand-hole coverplate that matches the material and finish of the pole. Locate hand-hole based on Owner design of security cameras.
4. Provide poles with an internal ground lug easily accessible from the hand-hole.
5. Provide poles with a base plate welded to the pole utilizing a backup ring and full-penetration welded connection.
6. Provide a one piece base cover to completely cover foundation hardware.
7. Aluminum Poles:
   a. Seamless extruded aluminum shafts fully welded to a cast aluminum anchor base assembly.
      1) Provide shaft square, straight, and meeting requirements of AASHTO Standard Specifications.
      2) Pole Height: As indicated in the Luminaire Schedule.
8. Pole Finish:
   a. Provide external surfaces of the pole, base cover, support arms, and luminaires finished in the same material and color.
   b. Provide poles chemically cleaned, rinsed, phosphatized, sealed, and dried.
   c. Apply an electrostatic application of polyester-power paint to external surfaces.
   d. Oven-bake complete unit to form a homogeneous, non-porous surface. Provide completed finish with no sags, drips, oxidation, or runs.
9. Anchor Bolts: Provided by pole manufacturer of size and length and quantity as recommended by pole manufacturer.
   a. Fabricate anchor bolts from hot rolled carbon steel bar with an L bend on one end.
   b. Provide galvanized anchor bolts with a minimum of 12-inches on the threaded end.
   c. Provide bolt circle and bolt projection dimensions with manufacturer's Shop Drawings.
10. Wrap poles in a protective material for shipment to the Project site.

2.10 EXTRA MATERIAL

A. Furnish extra materials described below that match product installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Glass and plastic lenses, covers, louvers, globes, guards, and other removable fixture parts: 5 percent or one dozen (whichever is less) of each type and rating installed. Furnish at least one of each type.
2. Control gear: 5 percent or one dozen (whichever is less) of each field-replaceable control module, driver, ballast, or individual fixture transformer. For fixtures with non-easily replaceable control gear provide 5 percent or one dozen (whichever is less) extra fixtures. Confirm non-replaceable products during submittal process.
3. Adjustable accent lights (track, recessed, or surface mounted): 10 percent of each beam angle lens (or removable lens accessory), 10 percent or one dozen (whichever is less) additional accessory lenses, color filters, louvers, and other accessories specified for use during final focusing.
4. For non-decorative LED lights, provide 2 percent additional fixtures, or minimum two fixtures.
5. Touch-Up Paint: 2 gallons, to match color of pole finish.

2.11 DISPOSAL AND REPLACEMENT

A. LED manufacturer is responsible for the disposal of expired LED arrays and heat sinks. Clearly label fixture with return information, disposal procedures and manufacturer disposal contact information.

B. Owner will pay for shipping.

C. Manufacturer is required to inform the Owner of new power requirements and /or lumen output values if new replacement components prior to shipping replacement parts.

D. Label disposal and replacement information inside the luminaire and in the project operation and maintenance manuals along with O&M requirements listed in Division 01, General Requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Meet general requirements of NFPA 70, National Electric Code.

B. Mounting heights specified on drawings:
   1. Wall Mounted Luminaires:
      a. Centerline of luminaire.
   2. Pendant Mounted Luminaires:
      a. Bottom of luminaire unless specifically identified in the Luminaire Schedule or on drawings.

C. Support:
   1. Support by separate means from the building structure and not from the ceiling system, ductwork, piping, or other systems.
   2. Final decision as to adequacy of support and alignment will be given by the Architect.

D. Power Supplies:
   1. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
      a. Ambient temperature: -4 degrees to 122 degrees F.
      b. Relative humidity: Maximum 90 percent, non-condensing.
      c. Protected from dust and excess moisture during installation.
   2. Install per manufacturers prescribed methods.
   3. Located remote mounted power supplies and transformers within the distance limitations specified by the power supply manufacturer.

E. Level luminaires, align in straight lines, and locate as shown on the architectural elevations and reflected ceiling plan.

F. Manufacturer's labels or monograms not visible after luminaire is installed, but must be included for future reference.

G. Recessed Luminaires:
   1. Trims which fit neatly and tightly to the surfaces in which they are installed without light leaks or gaps.
   2. Install heat resistant non-rubber gaskets to prevent light leaks or moisture from entering between luminaires trim and the surface to which they are mounted.

H. Pole Luminaires:
   1. Provide cast-in-place concrete foundations for pole mounted luminaires.
   2. Concrete: As specified in Division 03, Concrete.
   3. Foundation Forms: As indicated.
   4. Place anchor bolts in foundation as recommended by manufacturer in the required bolt circle size.
   5. Tie reinforcing steel in foundation to the anchor bolts to form a solid cage.
   6. Tamp wet concrete during pouring to assure complete coverage below, around and within the cage and form.

7. Hand finish top of foundation to produce a smooth, level surface.
8. Provide a minimum 10-foot copper-clad steel ground rod at each pole base. Connect from ground rod to the ground lug in the pole with minimum AWG 8 copper conductor.
9. Install pole mounted luminaires plumb with luminaires level, and with reflector distribution in the direction indicated in the Drawings.
   a. Grout around the pole base at the foundation to close openings.
   b. Install pole base cover over exposed installation hardware.

I. Tungsten Halogen Lamps:
   1. When lamping tungsten halogen luminaires use silk gloves to insert lamps.
   2. Do not energize tungsten halogen luminaires during construction to prevent dust build up on lamp, socket and lamp chamber. Lamping occurs as last stage of construction.

3.02 COORDINATION OF WORK

A. Architectural Reflected Ceiling Plans take preference as to the exact placement of the luminaires in the ceiling.

B. Determine ceiling types in each area and provide suitable accessories and mounting frames where required for recessed luminaires. Luminaire catalog numbers do not necessarily denote specific mounting accessories for type of ceiling in which a luminaire may be installed.

3.03 AIMING

A. Aim luminaires with proper lamps installed.

B. Aim directional luminaires, including but not limited to luminaires described in the Contract Documents or by the luminaire manufacturer as aimable, adjustable, or asymmetric as follows:
   1. Provide the lighting pattern for which the luminaire is designed.
   2. Provide the lighting pattern as shown on the drawings.
   3. Predetermined aiming points as shown on the drawings.
   4. Where aiming cannot be determined, request, in writing, clarification from the Architect, indicating luminaires needing clarification.

C. Re-aim luminaires as determined by Architect during final project walkthrough.

D. Install adjustable luminaires with dead zone of rotation away from intended aiming point

3.04 PROJECT CLOSEOUT

A. Leave luminaires clean at the time of acceptance of the work. If luminaires are deemed dirty by the Architect at completion of the work, clean them at no additional cost. Protective plastic wrap is to be removed from parabolic luminaires just prior to Owner acceptance.

B. Provide fixtures with new lamps operating at time of final acceptance. Exception: For fluorescent dimming fixtures, provide minimum 100 hour/maximum 200 hour, continuously lit lamps or per ballast manufacturer's recommendations.

C. Where incandescent lamps are used for construction lighting, replace the lamps with new lamps just prior to occupancy by the Owner.

END OF SECTION

SECTION 26 56 00 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Drivers

C. Lamps.

D. Poles and accessories.

E. Luminaire accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 03 30 00 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.

C. Section 26 05 29 - Hangers and Supports for Electrical Systems.

D. Section 26 05 33.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals.

B. IEEE C2 - National Electrical Safety Code.

C. IES LM-63 - IESNA Standard File Format for Electronic Transfer of Photometric Data and Related Information.

D. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products.

E. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction.

G. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems.

H. NFPA 70 - National Electrical Code.

I. UL 1598 - Luminaires.

J. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
2. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

B. Buy America Act:

1. This specification section contains products that are required to comply with federal build America, buy America act 117-58; 70901-52 requirements. The contractor shall review the requirements of this act and provide products that comply for areas of the project where buy America compliance is required. In addition to providing the products and materials, the contractor shall provide certificates of materials origin (CMO) submittal for each product required to comply prior to procuring the materials.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

C. Shop Drawings:
   1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
   2. Provide photometric calculations where luminaires are proposed for substitution upon request.
   3. Provide structural calculations for each pole proposed for substitution.

D. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.
   2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
   3. Lamps: Include rated life and initial and mean lumen output.
   4. LED Retrofit Luminaire Conversion Kits: Include list of compatible luminaires and/or criteria for compatibility.
   5. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.

E. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires to be installed and comply with designated structural design criteria.

F. Field Quality Control Reports.
   1. Include test report indicating measured illumination levels.

G. 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.

H. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.
   3. Extra Drivers: Two percent of total quantity installed for each type, but not less than one of each type.
   4. Extra Fuses: Five percent of total quantity installed for each type, but not less than two of each type.
   5. Touch-Up Paint: 2 gallons, to match color of pole finish.

J. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 - PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, drivers, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.

H. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 DRIVERS

A. Dimmable LED Drivers:
   1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
   2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.04 LAMPS

A. Lamps - General Requirements:
   1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
   2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
   3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
   4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Architect to be inconsistent in perceived color temperature.

2.05 POLES

A. All Poles:
   1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
   2. Structural Design Criteria:
      a. Comply with AASHTO LTS.
      b. Wind Load: Include effective projected area (EPA) of luminaire(s) and associated supports and accessories to be installed.
      c. Dead Load: Include weight of proposed luminaire(s) and associated supports and accessories.
      d. Include structural calculations demonstrating compliance with submittals.
   3. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires in accordance with NECA/IESNA 501.

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

G. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

H. Pole-Mounted Luminaires:
   1. Maintain the following minimum clearances:
      a. Comply with IEEE C2.
      b. Comply with utility company requirements.
   2. Foundation-Mounted Poles:
      a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 03 30 00.
         1) Install anchor bolts plumb per template furnished by pole manufacturer.
         2) Position conduits to enter pole shaft.
      b. Install foundations plumb.
      c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
      d. Tighten anchor bolt nuts to manufacturer's recommended torque.

e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
f. Install anchor base covers or anchor bolt covers as indicated.

3. Grounding:
   a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
4. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.

I. Install accessories furnished with each luminaire.

J. Bond products and metal accessories to branch circuit equipment grounding conductor.

K. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Correct wiring deficiencies and repair or replace damaged or defective products.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

3.06 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

SECTION 31 10 00
SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. City of St. Helens Special Provision 02310: Refer to City spec for site clearing requirements.

B. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

D. Section 01 57 13 - Temporary Erosion and Sediment Control.

E. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

F. Section 02 41 00 - Demolition: Removal of built elements and utilities.

G. Section 31 22 00 - Grading: Topsoil removal.

H. Section 31 22 00 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

I. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SITE CLEARING

A. Comply with other requirements specified in Section 01 70 00.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds.

B. Do not remove or damage vegetation beyond the limits indicated on drawings.

C. Install substantial, highly visible fences at least 3 feet high (at least 1 m high) to prevent inadvertent damage to vegetation to remain:
   1. At vegetation removal limits.

D. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

E. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
   2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).
   3. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.

F. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.04 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 31 10 00

SECTION 31 22 00
GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of topsoil.

B. Rough grading the site for site structures and building pads.

C. Finish grading.

1.02 RELATED REQUIREMENTS

A. Section 31 10 00 - Site Clearing.

B. Section 31 23 16 - Excavation.

C. Section 31 23 16.13 - Trenching: Trenching and backfilling for utilities.

D. Section 31 23 23 - Fill: Filling and compaction.

E. Section 32 91 13 - Soil Preparation: Planting soil

1.03 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with state and city standards.

B. Comply with requirements of the geotechnical report.
   1. Report of Geotechnical Engineering Services for St. Helens RIverwalk Phase I by NV5 dated December 16, 2021.
   2. Maintain one copy on site.

C. Geotechincal construction observation will be performed on site by the consultant Geotechincal Engineer for the following construction activites:
   1. Stripping topsoil.
   2. Subgrade preparation prior to placement of fill.
   3. Placement and compaction of fill materials.
   4. Trench backfill.
   5. Subgrade preparation for overlook structure foundations.
   6. Retaining wall foundation subgrade preparation and backfill compaction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Materials: See Section 31 23 23.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain as shown in the Drawings from damage by grading equipment and vehicular traffic.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil , unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. See Section 31 23 23 for filling procedures.

G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

H. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 SOIL REMOVAL

A. Remove excavated topsoil from site.

B. Stockpile subsoil to be re-used on site; remove remainder from site.

C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

D. See Section 32 91 13 for planting soil placement in seeding and planting areas.

E. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

F. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.06 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

3.07 FIELD QUALITY CONTROL

A. See Section 31 23 23 for compaction density testing.

3.08 CLEANING

A. Remove unused stockpiled subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION 31 22 00

SECTION 31 23 16
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for footings, slabs-on-grade, paving, and site structures.

B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Document: Report of Geotechnical Engineering Services for St. Helens Riverwalk Phase 1 by NV5 dated December 16, 2021.

B. Section 01 57 13 - Temporary Erosion and Sediment Control: Slope protection and erosion control.

C. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.

D. Section 31 22 00 - Grading: Soil removal from surface of site.

E. Section 31 22 00 - Grading: Grading.

F. Section 31 23 16.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

G. Section 31 23 23 - Fill: Fill materials, backfilling, and compacting.

H. Section 33 41 00 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.

1.04 QUALITY ASSURANCE

A. See Section 31 22 00 for Owner's Representative construction observation during excavation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Bedding and Fill to Correct Over-Excavation:
   1. See Section 31 23 23 for bedding and corrective fill materials at general excavations.
   2. See Section 31 23 16.13 for bedding and corrective fill materials at utility trenches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

B. Survey existing adjacent structures and improvements and establish exact elevations at fixed points to act as benchmarks.
   1. Resurvey benchmarks during installation of excavation support and protection systems and notify Owner if any changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

C. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by Owner's Representative. If the proposed excavation extends more than 1 foot into the prevailing groundwater, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by Geotechnical Engineer.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 10 00 for clearing, grubbing, and removal of existing debris.

C. See Section 31 22 00 for topsoil removal.

D. Locate, identify, and protect utilities that remain and protect from damage.

E. Notify utility company to remove and relocate utilities.

F. Protect bench marks, survey control points, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

G. Protect plants and other features to remain.

H. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Owner's Representative.

3.03 EXCAVATING

A. Excavate to accommodate new structures and construction operations.
   1. See Section 31 23 16.26 for required excavation clearances for pipes in utility trenches.

B. Notify Owner's Representative of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Comply with excavation recommendations in the Geotechnical Report, including but not limited to earthwork equipment, maximum slopes and shoring, dewatering.

D. Provide temporary means and methods, as required, to remove all water from excavations until directed by Owner's Representative. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 SUBGRADE PREPARATION

A. See Section 31 23 23 for subgrade preparation at general excavations.

B. See Section 31 23 16.13 for subgrade preparation at utility trenches.

C. See Section 32 91 13 for subgrade preparation at planting areas.

3.05 FILLING AND BACKFILLING

A. See Section 31 23 23 for fill, backfill, and compaction requirements at general excavations.

B. See Section 31 23 16.13 for fill, backfill, and compaction requirements at utility trenches.

C. See Section 31 22 00 for rough and final grading and topsoil replacement requirements.

D. See Section 32 91 13 for planting soil placement.

3.06 REPAIR

A. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 23 23.

3.07 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces by Owner's Representative before placement of foundations.

3.08 CLEANING

A. Stockpile excavated material to be re-used in area designated on site in accordance with Section 31 22 00.

B. Remove excavated material that is unsuitable for re-use from site.

C. Remove excess excavated material from site.

3.09 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION 31 23 16

SECTION 31 23 16.13
TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. City of St. Helens Special Provision 03200: Refer to City spec for trench excavation, bedding, & backfill requirements.

B. Document Preliminary Report of Geotechnical Services (dated February 2, 2022) by NV5: Geotechnical report; bore hole locations and findings of subsurface materials.

C. Section 03 30 00 - Cast-in-Place Concrete.

D. Section 31 22 00 - Grading: Site grading.

E. Section 31 23 16 - Excavation: Building and foundation excavating.

F. Section 31 23 23 - Fill: Backfilling at building and foundations.

G. Section 33 41 00 - Subdrainage: Filter aggregate and filter fabric for Flow Through Planter Systems and French Drain Systems.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.04 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop 2022, with Errata .

B. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)) 2012 (Reapproved 2021).

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. Granular Fill: See Geotech Report.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 22 00 for additional requirements.

C. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Engineer.

3.03 TRENCHING

A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

G. Remove excavated material that is unsuitable for re-use from site.

H. Stockpile excavated material to be re-used in area designated on site.

I. Remove excess excavated material from site.

J. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Engineer. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

K. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Engineer.

3.04 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches (150 mm) compacted depth.

F. Slope grade away from building minimum 2 inches in 10 feet (50 mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

G. Correct areas that are over-excavated.
   1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

H. Compaction Density Unless Otherwise Specified or Indicated:
   1. Per Geotech Report.

I. Reshape and re-compact fills subjected to vehicular traffic.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS

A. Utility Piping and Conduits:
   1. Bedding: Use granular fill per City of St Helens detail 300 and municipal code 18.24.050.
   2. Cover with granular fill per City of St Helens detail 300 and muncipal code 18.24.050.

3. Fill up to subgrade elevation per City of St Helens detail 300 and municipal code 18.24.060.
4. Compact in maximum 8 inch (200 mm) lifts to 95 percent of maximum dry density.

3.07 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 1 inch (25 mm) from required elevations.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch (25 mm) from required elevations.

3.08 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor") or AASHTO T 180.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Frequency of Tests: per Geotech Report.

3.09 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION 31 23 16.13

SECTION 31 23 23
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for building volume below grade, footings, slabs-on-grade, paving, and site structures.

B. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

A. Document: Report of Geotechnical Engineering Services for St. Helens Riverwalk Phase I by NV5 dated December 16, 2021.

B. Section 01 57 13 - Temporary Erosion and Sediment Control: Slope protection and erosion control.

C. Section 03 30 00 - Cast-in-Place Concrete.

D. Section 31 22 00 - Grading: Removal and handling of soil to be re-used.

E. Section 31 22 00 - Grading: Site grading.

F. Section 31 23 16 - Excavation: Removal and handling of soil to be re-used.

G. Section 31 23 16.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

H. Section 33 41 00 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

1.03 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.04 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil–Aggregate Subbase, Base, and Surface Courses 2017 (Reapproved 2021).

B. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop 2022, with Errata .

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2019.

D. ASTM C150/C150M - Standard Specification for Portland Cement 2022.

E. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)) 2012 (Reapproved 2021).

F. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method 2015, with Editorial Revision (2016).

G. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)) 2012 (Reapproved 2021).

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Samples for testing: Provide samples of fill materials to Owner's Representative Geotechincal Engineer for compaction tests and percent fines tests.

D. Compaction Density Test Reports.

1.06 QUALITY ASSURANCE

A. See Section 31 22 00 for Owner's Representative construction observation during fill placement.

B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill: Subsoil excavated on-site meeting the requirements of the Geotechnical Report.

B. Structural Fill - Reference Geotechnical Report for requirements.

C. Imported Granular Material - Reference Geotechnical Report for base rock requirements for foundations, paving, and wall backfill.

D. Trench Backfill - See Section 31 23 16.13

E. Drain Rock - Reference Getechnical Report for requirements.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. See Section 31 22 00 for additional requirements.

D. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface in accordance with requirements in Geotechnical Report.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

F. Correct areas that are over-excavated.

1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 100 percent of maximum dry density.
2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

G. Compaction Density Unless Otherwise Specified or Indicated:
1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.

H. Reshape and re-compact fills subjected to vehicular traffic.

I. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Owner's Representative. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FILL AT SPECIFIC LOCATIONS

A. Reinforced Soil Retaining Wall Backfill:
1. See Section 32 32 34 for reinforced backfill placement requirements.

B. Over Subdrainage Piping:
1. See Section 33 41 00 for fill placement requirements.

C. Over Buried Utility Piping and Conduits in Treches:
1. See Section 31 23 16.13 for trench backfill placement requirements.

D. At Planting Areas and Lawn Areas:
1. See Section 32 91 13 for planting soil subgrade prep and placement requirements.

E. Under Monolithic Paving and Monolithic Paver Setting Beds:
1. Compact subsoil to 95 percent of its maximum dry density before placing fill.
2. Use general fill.
3. Compact to 95 percent of maximum dry density.
4. See Section 32 11 23 for aggregate base course placed over fill.

3.05 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.06 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection and testing.

3.07 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

END OF SECTION 31 23 23

SECTION 31 36 00
GABIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes:

1. Rock-filled wire mesh gabion baskets

B. Related Sections:

1. Division 01 Section 01 35 70 – Buy America Certification Procedures.
2. Division 31 Section 31 22 00 “Grading”, Section 31 23 16 “Excavation”, and Section 31 23 23 “Fill” for definitions, submittals, quality requirements, drainage course material, geotextile, embankment construction, and other information not provided in this section.
3. Division 32 Section 32 32 34 “Reinforced Soil Retaining Walls” for structural wall construction over which gabions are placed.

1.03 ACTION SUBMITTALS

A. Product Data: material data for baskets, lacing wire or clip fasteners, anchors, and rock. Contractor to also submit manufacturer data on gabion basket assembly.

B. Shop Drawings: none.

C. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

PART 2 - PRODUCTS

2.01 GABION BASKETS AND ROCK

A. Provide materials meeting the requirements of the Geotechnical report and Gabion Cribbing and size as noted in contract plans.

2.02 ANCHOR RODS AND ASSEMBLIES

A. Anchor rods to be coil rod as noted on plans. Minimum yield strength to be 55ksi.

B. Nuts to be heavy duty nuts to match anchor rod.

C. Plates and rolled steel shapes to be as noted on plans. Minimum yield strength to be 36ksi.

D. Rods, plates, nuts, and all related steel anchorage elements to be galvanized with hot-dip zinc coating, ASTM A 153, Class C.

PART 3 - EXECUTION

3.01 PREPARATION

A. Construction Geosynthetic Retaining Wall as noted on plans. Install anchor rods and related embedded hardware during embankment construction.

B. Allow preloading settlement to occur as noted on plans prior to installing gabion facing.

C. Prep rock pad under gabions as noted on plans. Pad may be placed prior to preloading settlement, but grade adjustments and recompaction will need to occur after settlement period.

3.02 ERECTION

A. Install gabions per plans.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

1.02 RELATED REQUIREMENTS

A. Section 31 22 00 - Grading: Preparation of site for base course.

B. Section 31 23 16.13 - Trenching: Compacted fill over utility trenches under base course.

C. Section 31 23 23 - Fill: Compacted fill under base course.

D. Section 32 13 00 - Site Concrete: Finish concrete surface course.

E. Section 32 14 13 - Unit Paving.

F. Section 33 05 61 - Concrete Manholes: Manholes including frames.

G. Section 33 41 00 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

1.03 REFERENCE STANDARDS

A. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method 2015, with Editorial Revision (2016).

B. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)) 2012 (Reapproved 2021).

C. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.

D. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017a, with Editorial Revision (2021).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

1.05 DELIVERY, STORAGE, AND HANDLING

A. When aggregate materials need to be stored on site, locate where indicated on drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate Base Rock: Imported granular material meeting the requirements in the Geotechnical Report.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for general requirements for testing and analysis of aggregate materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Place aggregate in maximum 6 inch layers and roller compact to specified density.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor").

3.06 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION 32 11 23

SECTION 32 13 00 - SITE CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section includes:

1. Construction of concrete cast-in-place flatwork, steps and curbs.

1.02 RELATED SECTIONS

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

B. Section 01 35 70 – Buy America Certification Procedures

C. Section 01 40 00 - Quality Requirements.

D. Section 01 60 00 - Product Requirements

E. Section 03 10 00 – Concrete Forming & Accessories

F. Section 03 20 00 - Concrete Reinforcing

G. Section 03 30 00 - Cast-in-place Concrete

H. Section 05 70 00 - Site Railings

I. Section 31 10 00 – Site Clearing

J. Section 32 11 23 – Aggregate Base Courses

1.03 SUBMITTALS

A. Submittals shall be made in accordance with the requirements of the General Provisions, except as noted herein.

B. Product Data: Submit manufacturer's detailed technical data for all materials used including, detectable warning panels, joint filler, admixtures, and curing compounds.

C. Laboratory Test Reports: Required for concrete materials and mix design.

D. Material test reports and certificates.

E. Mix design proposal listing all materials, admixtures, and their proportions. Include:

1. Water-cement ratio, slump, and aggregate grading.
2. Whether the mix is appropriate for pumping.
3. Evidence of ability of mix to meet requirements for limited shrinkage.
4. Provide evidence that mix design meets the strength requirements.
5. Indicate materials sources for principal constituents.

F. Submit schedule for concrete placement operations before commencing work. Show on plans locations of construction, contraction and expansion joints.

G. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

H. Shop Drawings:

1. Submit joint layout plan and drawings showing reinforcement, bending, and placement of concrete reinforcement. Comply with ACI 315 showing bar schedules, stirrup spacing, and diagrams of bent bars and arrangement of concrete reinforcement.

1.04 MOCK-UP

A. Mock-Up Flatwork: On site, in an approved location, construct a full sized, complete mock-up of a concrete panel minimum 36” X 36” including all joints and finishes and sealed and sand-finish isolation joint.

1.05 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of concrete to ensure proper fitting of work.

B. Obtain all cement materials from the same source throughout.

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

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

D. 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."
3. Conform to ACI 305 when concreting during hot weather.
4. Conform to ACI 306.1 when concreting during cold weather.

E. Conform to all local public works standards for paving work on public property.

F. Pre-installation Conference: Conduct conference at Project site.

1.06 QUALIFICATIONS

A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1.07 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities and building access.

1.08 REFERENCES

A. American Concrete Institute:

1. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 - Specifications for Structural Concrete.
3. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

4. ACI 347 – Guide to Formwork for Concrete

B. ASTM International:

1. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
3. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
4. ASTM C33 - Standard Specification for Concrete Aggregates.
5. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
6. ASTM C150 - Standard Specification for Portland Cement.
7. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
8. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
9. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
10. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
11. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
12. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
13. Section 5-05 – Cement Concrete Pavement

PART 2 - PRODUCTS

2.01 AGGREGATE BASE ROCK – SEE SECTION 32 11 23

2.02 FORMS – SEE SECTION 03 10 00

2.03 REINFORCING MATERIALS – SEE SECTION 03 20 00

2.04 COMPONENTS

A. Concrete Materials:

1. Portland Cement: ASTM C 150, Type I or II and IA or IIA. Supplement with the following:
   a. Fly Ash: ASTM C 618, Class F. Use no additives to cause rapid heating or setting.

B. Air-Entraining Admixture: Entrained air shall be a required additive in amount of five percent, plus or minus one percent.

1. ASTM C 260.
2. Chemical Admixtures: ASTM C 494, Type A, water reducing or Type D, water reducing and retarding.
3. Mineral Admixture: ASTM C 618, Class F or Class C.

4. Standard Aggregates: ASTM C 33 and as specified. Sand and aggregates to be consistently light gray to promote a finished surface reflectivity of no less than a 0.3 Albedo level.

C. Water: Potable and ASTM C 94/C 94M

D. Concrete Accessories:

1. Exterior Curing Compound: Solvent based acrylic, ASTM C 309, Type I, clear, Polyseal by Chem-Masters, J-20 Acrylic Cure, Seal & Dustproofer 14 by Dayton Superior, Acrylic Sealer by A.C. Horn, Preston C & S 600 by Preston Pacific, Kure-N-Seal by Sonneborn, Sealtight CS-309 by W.R. Meadows, Sikagard by Sika, Cure & Seal by Symons, or Polyclear by Upco.

2. Clear Acrylic Sealers: Liquid Membrane Curing Compound conforming to AASHTO M148 (ASTM C390, Type 1 free of paraffin or petroleum. Aggre Glaze by The Burke Company, Traz by Chem-Masters, J-25 Acrylic Sealer Gloss 25 by Dayton Superior, Horntraz by A.C. Horn, TIAH by W.R. Meadows, Sono-Glaze or White Roc-9 by Sonneborn, Thoroglaze H by Thoro System Products.

3. Epoxy Bonding Agent, Concrete to Concrete: ASTM C 881, 100 percent solids, epoxy resin and hardener, 881 LPL Epoxy by The Burke Company, Concressive 1001 LPL by Adhesive Engineering.

4. Patching Compound: Two component cement base and acrylic polymer compound, 5,000 psi in 28 days minimum compressive strength, Burke Acrylic Patch by The Burke Company, Epolith Patcher or Sonopatch by Sonneborn.

5. Polyethylene Moisture Retaining Membrane: ASTM D 2103, Clear or white, 6 mils thick.

6. Reinforced Laminated Paper Moisture Retaining Membrane for Pedestrian Traffic Areas: ASTM C 171, Orange Label Sisalkraft by Fortifiber Corp.

E. Concrete Mix Requirements:

1. Maximum Aggregate Size: 3/4 inch.

2. Maximum Slump: 4 inches + 1/2 to - 1 inch.

3. Entrained Air for Exterior Horizontal Surfaces: 6 percent + or – 1 percent.

4. Minimum Compressive Strength: f'c = 3,000 psi in 28 days for non-vehicular areas

5. Minimum Compressive Strength: f'c = 4,000 psi in 28 days vehicular areas.

6. Water Reducing Admixtures: Type A or D.

F. Proportion Adjustments:

1. Mix designs may be adjusted when material characteristics, site conditions, weather, test results, or other circumstances warrant a revised mix design.

2. Submit revised concrete mix design to Owner's Representative.

2.05 RETEMPERING

A. The re-tempering of concrete or mortar in which the cement has partially hydrated will not be permitted.

2.06 RELATED MATERIALS

A. Preformed Expansion Joint: Conform to requirements of AASHTO M 153 or AASHTO M 213, except material furnished under AASHTO M 213 shall be tested in conformance to ASTM D 1751 and shall be 1/2 inch.

B. Use fillers conforming to AASHTO M 213, except binder.

C. Curing Compound: White pigmented curing compound conforming to requirements of ASTM C 309.

D. Isolation Joint Filler Strips: ASTM D 1751, Sealtight 1/2” thick max. Ceramar Flexible Foam Expansion Joint Filler as mfg. By W.R. Meadows, Inc., P.O. Box 543, Elgin, Il., 60121, (708) 683-4500. OR approved equal.

E. Isolation Joint Sealant: Self-leveling, white color or approved grey.

F. Expansion Joint Sand: Silica Quartz Sand.

G. Bonding Agent: ASTM 1059, Type II, non redispersible, acrylic emulsion or stryrene butadiene.

2.07 CONCRETE MIXING

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

B. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: As noted on the drawings.
2. Maximum Water-Cementitious Materials Ratio: As noted on the drawings.
3. Slump Limit: As noted on the drawings, plus or minus 1 inch (25 mm).
4. Air Content: 5 percent, plus or minus 1.5 percent at point of delivery.

C. Comply with requirements and with ASTM C 94 and ASTM C 1116.

1. When air temperature is between 85 deg F 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.

D. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixers of 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, mix type, mix time, quantity, and amount of water added.

2.08 FABRICATING REINFORCEMENT

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

PART 3 - EXECUTION

3.01 EXAMINATION

A. General: Comply with manufacturer's recommended procedures and installation sequence. Install block outs for other miscellaneous elements rigid, straight, plumb, and level.

B. Verify compacted subgrade and base rock is acceptable and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

3.02 PREPARATION

A. Subgrade: Maintain in a smooth, compacted condition as specified in Section 31 2000, Earthwork.

B. Compact subgrade in maximum un-compacted thickness of 6 inch lifts to no less than 95% of the maximum dry density at optimal moisture, as determined by ASTM 1557 or as determined by AASHTO T-99 compaction control test, for a depth of 12 inches. The base material should show no visible movement when compaction is complete. Keep free from sediment throughout the entire job.

C. Notify Owner’s Representative 24 hours prior to placing concrete.

D. Proof-roll prepared subgrade 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.

E. Moisten base to minimize absorption of water from fresh concrete.

F. Remove standing water from formed surfaces.

G. Remove soft soils from subgrade and footing trenches.

3.03 FORMING

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

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

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

D. Place and secure forms to correct location, dimension, profile and gradient

E. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

F. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.04 REINFORCEMENT

A. Place reinforcement as detailed.

B. Interrupt reinforcement as detailed.

C. Place dowels and reinforcement to achieve pavement and curb alignment as detailed.

D. Provide doweled joints as indicated with one end of dowel set in capped sleeve to allow longitudinal movement.

3.05 JOINTS

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

B. Construction Joints: Locate construction joints as indicated on the structural drawings or as approved by Landscape Architect. Remove laitance and thoroughly clean and dampen construction joints prior to placement of fresh concrete.

C. Control Joints: Construct control joints to form panels of patterns as defined in the drawings or as specified. Use inserts 1/4 inch wide by depth indicated on the drawings. Where saw-cut joints are required, start cutting as soon as concrete has hardened sufficiently to prevent dislodgment of aggregates. Saw a continuous slot to the depth indicated on the drawings. Where joint layout is not specified, the aspect ratio of the slab panels should be a maximum of 1.5:1. "L" and "T" shaped panels should be avoided. If an alternative method, timing, or depth is proposed for saw cutting, submit detailed procedure plans for review and acceptance.

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

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3.07 PLACING CONCRETE DURING HOT WEATHER

A. Comply with ACI 301.

B. Prepare concrete aggregates, mixing water, and other ingredients; place concrete; cure; and protect in accordance with the requirements of ACI 305. Provide special admixtures and special curing methods required by other paragraphs in this section even though not required by ACI 305. Water-reducing and/or set-retarding admixtures shall be used in such quantities as especially recommended by the manufacturer to assure that the concrete is workable, and lift lines will not be visible in concrete work exposed at completion.

C. Every effort shall be made to maintain a concrete temperature below 90 degrees F at time of placement. Ingredients may be cooled before mixing to prevent excessive concrete temperature.

D. Provisions may be made for windbreaks, shading, fog spraying, sprinkling, or wet cover, when necessary.

3.08 PLACING CONCRETE DURING COLD WEATHER

A. Comply with ACI 306.1.

B. Do not place concrete when ambient temperature is below 40 degrees F, or approaching 40 degrees F and falling, without special protection as specified or as approved by the Owner's Representative. No concrete shall be placed against frozen earth or ice, or against forms and reinforcement with frost or ice present.

C. Concrete placed shall be cured and protected as specified for a minimum of 7 days except that the strength requirements may require additional protection and curing during cold weather due to delayed field strength gain.

D. The actual temperature of the concrete surface determines the effectiveness of protection, regardless of air temperatures or whether the objective is durability or strength. Because corners and edges of concrete are most vulnerable to freezing and usually are more difficult to maintain at the required temperature, their temperatures should be monitored to evaluate and verify the protection provided.

E. Submit a detailed plan for cold weather curing and protection of all concrete that is to be placed and/or cured in weather below 40 degrees F. Conform to ACI 306 for cold weather requirements. Provide the temperature protection and curing for the 7 day period.

F. Additives for the sole purpose of providing “freeze protection” shall not be used. Additives to shorten the cure time may be used if approved; however, the concrete shall be placed and cured at all times at temperatures above freezing as specified.

3.09 PLACING CONCRETE

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work. Notify Owner’s Representative 48 hours in advance for site visit.

B. Moisten subbase 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.

C. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

D. Do not add water to concrete during delivery, at Project site, or during placement.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

F. 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 from 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.

G. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

H. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by Owner’s Representative.

I. 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 surface treatments.

J. Level slabs to grades as shown on Drawings.

K. Tool radius of pavement corners as shown on Drawings.

3.10 JOINTS

A. Isolation Joints: Form isolation joints of flexible foam filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Do not place expansion joints in flatwork unless directed by Owner's Representative.
2. Extend joint fillers full width and depth of joint.
3. Place top of joint filler flush 1/4" from top surface of finished concrete if joint sealant is not indicated.
4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

B. Control joints per plan.

C. Edging: Tool edges of pavement and joints in concrete after initial floating with an edging tool to the radius as shown on the drawings. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.11 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screening, initial floating, or finishing operations is prohibited.

3.12 FINISHING HORIZONTAL CONCRETE

A. Floated Slab Surface to Receive a Light Broomed Finish:

1. Comply with ACI 301, paragraph 11.7.2, begin floating when concrete surface has stiffened sufficiently to permit float finishing.
2. Check level of surface with a 10 foot straightedge at two angles during the first floating, level concrete to Class B, 1/4 inch in 10 feet, and refloat immediately to a uniform sandy texture.

B. Direction of Light Broom Finish: Perpendicular to direction of traffic.

C. Place sealer on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions. Sealer shall not change the concrete color. Immediately re-spray any area covered with curing compound and damaged during the curing period.

D. Curing Procedures:

1. Spray apply exterior curing compound on exterior horizontal concrete surfaces at manufacturer's recommended rate.
2. Placement of clear plastic for inclement weather is prohibited. Tent if necessary.

3.13 FINISHING CONCRETE CURBS

A. Smooth-Formed Finish: Sack rub finish to produce even texture and fill all pits and air holes and honeycombing.

1. While concrete is green and moist, apply with rubber float the following mixture: one part sand, one part cement, mixed as dry as practicable.
2. Fill all voids, repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities and rub off excess.

3. Use finish grinder to provide smooth and even surface. Grit to be determined in the field.

   a. Mock-up concrete curb finishing at pre-approved location for review and approval.

B. At tops of curbs, 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

3.14 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.
3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4 inch.
4. Joint Spacing: 1/8”
5. Joint Width: Plus 1/16”, no minus.

3.15 FIELD QUALITY CONTROL

A. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301. Take cylinders for every 50 cubic yards of cement concrete placed.

B. One additional test cylinder will be taken during cold weather and cured on site under same conditions as concrete it represents.

C. One slump and air test will be taken for each set of test cylinders taken.

D. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.16 COMPLETION

A. Field Quality Control: Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature and test samples taken.

B. Surface Repairs for Exposed Concrete Surfaces:

1. Clean, dampen with water, and brush the patch substrate with bonding agent.
2. Fill voids and rock pockets with patching compound and compact in place and screed as recommended by patching compound manufacturer.
3. Finish exposed concrete surfaces to match adjoining surfaces.
4. Remove and replace the concrete if defects in seeding and texture of surface cannot be repaired to the Owner’s Representative’s satisfaction.

3.17 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Protect concrete from physical damage or reduced strength caused by air temperatures below 45 degrees F. and above 75 degrees F. during curing period, complying with recommendations in ACI 306R and 305R respectively.

C. Protect new uncured horizontal concrete with barricades.

D. Do not permit pedestrian or vehicular traffic over pavement for 7 days minimum after finishing.

E. Protect concrete from frost damage until protected by soil backfill or until cured for 28 days.

F. Protect concrete from shrinkage crack damage until protected by curing procedure.

3.18 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.

3.19 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

1. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION

SECTION 32 14 00 – UNIT PAVERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Stone unit pavers with grouted joints.

B. Preparation of concrete base.

C. Mortar bed, thin-set.

D. Cleaners and Sealers.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 35 70 - Buy America Certification Procedures

B. Section 03 30 00 - Cast-In-Place Concrete

C. Section 32 11 23 - Aggregate Base Courses

D. Section 32 13 00 - Site Concrete

1.03 REFERENCES

A. American National Standards Institute (ANSI)

1. American National Specifications for the Installation of Ceramic Tile.

B. American Society for Testing and Materials (ASTM)

1. C 67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile, Section 8, Freezing and Thawing.
2. C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
3. C 920, Specification for Elastomeric Joint Sealants.
4. C 936, Specification for Solid Concrete Interlocking Paving Units.
5. C 979, Standard Specification for Pigments for Integrally Colored Concrete.

C. Tile Council of America (TCA):

1. Handbook for Ceramic Tile Installation.

D. International Masonry Industry Standards All Weather Council – Recommended Practices and Guide Specifications for Cold Weather Masonry Construction

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has successfully completed mortar set unit paver installations similar in design, material, and extent indicated for this Project.

B. Single-source Responsibility: Obtain each color, type, and variety of unit paving, joint materials and setting materials from single sources with resources to provide products and materials of consistent quality, appearance and physical properties without delaying progress of the Work.

C. Field-constructed Mock-up: Prior to installation of pavers, erect mock-up(s) for each form and pattern of unit paver required. Build mock-up(s) using materials, base construction,

expansion joints, and special features for contiguous work, as indicated for final unit of Work.

D. Contractor shall conform to all local, state/provincial licensing and bonding requirements.

E. All material will be free from, cracks, seams and starts that could impair its structural integrity or function.

F. Color, texture and finish consistent with range of samples approved by Landscape architect.

1.05 SUBMITTALS

A. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

B. Manufacturer's drawings and details: Indicate perimeter conditions, relationship to adjoining materials and assemblies, expansion and control joints, concrete paver layout, patterns, color arrangement, installation and setting details.

C. Mortar color samples that indicate the extremes of color variation expected in the finished installation.

D. Stone pavers:

1. Three representative full-size samples of each paver type, thickness, color, finish that indicate the range of color variation and texture expected in the finished installation. Color(s) selected by the Owner's Representative from manufacturer's available colors.

2. Accepted samples become the standard of acceptance for the work.

3. Test results from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936.

4. Manufacturer's catalog product data, installation instructions, and safety data sheets for the safe handling of the specified materials and products.

E. Paver Installation Subcontractor:

1. Job references from projects of a similar size and complexity. Provide the Owner's Representative names, postal address, phone, fax, and email address.

1.06 MOCK-UPS

A. Install a 16-sf. area of specified unit paver and pattern.

B. Show paver size, color and finish as listed in Part 2.

C. This area will be used to determine joint sizes, lines, laying pattern(s), color(s), and texture of the job.

D. This area shall be the standard from which the work will be judged and may be incorporated into the work.

1.07 DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers packaging with identification labels intact.

1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

2. Deliver concrete pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.

3. Unload pavers at job site in such a manner that no damage occurs to the product.

C. Storage and Protection: Store materials protected such that they are kept free from mud, dirt, and other foreign materials. Store concrete paver cleaners and sealers per manufacturer's instructions.

1. Cover mortar sand with waterproof covering if needed to prevent exposure to rainfall or removal by wind. Secure the covering in place.

2. Protect cementitious materials from moisture and freezing temperatures. Store in a dry location.

1.08 ENVIRONMENTAL CONDITIONS

A. Do not install pavers during heavy rain or snowfall.

B. Do not install over when outside temperature is below 45° F (5° C).

PART 2 - PRODUCTS

2.01 UNIT PAVERS

A. Stone unit pavers

1. Manufacturer: Guinett Masonry, Inc.

2. Product: Columnar Basalt

3. Sizes: 11-7/8" x 23-7/8" x 1-1/4" thick

a. 5% of total stone quantity to be oversize in length, cut to size in field to minimize slivers. Reference drawings for locations.

4. Pattern: Per drawings.

5. Finish: Thermal

6. Installation method: Mortar set

2.02 MORTAR

A. Mortar bed or thin-set mortar: Meets ANSI A118.4, Specifications for latex-Portland cement mortar.

2.03 GROUT

A. Meets ANSI 118.7, polymer modified cement grouts for tile installation.

2.04 ACCESSORIES

A. Water: Potable and free from minerals or other materials that are detrimental to mortar and grout mixes.

B. Primer: As recommended by the mortar material manufacturer.

C. Mixes: Prepare pre-mix materials in accordance with manufacturer's written instructions.

PART 3 - EXECUTION

3.01 PREPARATION

A. Allowable Substrate Tolerances: Maximum 1/4 inch in 10 feet variation in substrate surface.

B. Layout:

1. Determine location of control joints.
2. Minimize pieces less than half size.
3. Locate cuts to be inconspicuous.

3.02 EXAMINATION

A. Inspect areas and conditions under which work is to be performed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.

B. Verify that concrete base is sloped for drainage and is free of standing water, dust, oil, grease, paint, wax, curing compounds, primer, sealers, form release agents, or any deleterious substances and debris which may prevent or reduce bonding. [Conduct moisture tests to verify that concrete surfaces are completely cured, free from hydrostatic pressure and having a moisture content of less than 5%.]

C. Verify that grout materials can be cleaned from pavers or provide coating to pavers to facilitate removal of grout materials.

D. Do not proceed with the work until unsatisfactory conditions have been corrected by the General Contractor or designated subcontractor to the satisfaction of the installer [and surfaces and conditions comply with the applicable requirements of ANSI A-108.1].

3.03 PREPARATION

A. Completely remove loose particles and debris from surface of concrete base. This may require mechanical grinding and scarifying of the surface.

B. Neutralize any trace of strong acid or alkali from the substrate prior to mortar application.

C. If leveling of the concrete surface is necessary, apply latex Portland cement mortar surface leveling materials to the surface of the substrate to bring the surface to a true, even plane. Allow mortar-leveling materials to set prior to installation.

D. Surface to receive [slurry coat and] mortar shall have a tolerance of ±1/4 in. (6 mm)

E. over 10 ft (3 m) for normal mortar setting bed applications and ±1/8 in. (3 mm) over 10 ft (3 m) for thin set mortar setting bed applications.

3.04 INSTALLATION

A. Moisten concrete base and apply slurry bond coat to concrete base per manufacturer’s directions.

B. Mix and apply 1” mortar setting bed material in accordance with the manufacturer's instructions. Spread mortar in quantities that will remain plastic and workable during installation of pavers.

C. Moisten the bottoms of the pavers prior to placing on mortar or thin-set materials.

D. Lay pavers in pattern(s) on mortar bed as indicated on the drawings. Saw cut pavers as required with a masonry saw. Cut perimeter units no less than 1/4 of full size units. Do not install stained, chipped, cracked, or broken pavers.

E. Maintain 3/8 in. wide joints. Joints may be 3/8 in. max.

F. Joints shall be uniform and straight in all both directions as indicated on the drawings.

G. Lippage: maintain no greater than 1/16 in. (1.5 mm) height difference between adjacent pavers.

H. Follow manufacturers recommended times for setting mortar to cure before grouting.

I. Maintain clean surfaces and joints prior to applying grout.

J. Grout joints in accordance with ANSI A108.10.

3.05 EXPANSION AND CONTROL JOINTS

A. Locate and obtain the approval of the Architect before commencing the installation.

B. In accordance with TCA Detail No. EJ171, Handbook for Ceramic Tile Installation.

1. Provide at maximum 12 ft (3.6 m) on center in each direction.
2. Provide where vertical construction contact the pavers including walls, columns, and curbs.
3. Carry completely through the assembly to surface.
4. Keep clear of mortar setting materials and grout.
5. Apply backer materials and sealant in joints as specified in Section 32 13 00.

3.06 CLEANING AND SEALING

A. Clean stone pavers with applicator in accordance with the manufacturer's written recommendations and application procedures.

3.07 FIELD QUALITY CONTROL

A. The final surface tolerance from grade elevations shall not deviate more than ±1/4 in. under a 10 ft straightedge.

B. Check final surface elevations for conformance to drawings.

3.08 PROTECTION

A. Protect finished work against weather, freezing and immersion in water for per mortar and grout manufacturer's recommendations.

B. Protect pavers from construction-related foot traffic and general foot traffic.

C. After work in this section is complete, the Contractor shall be responsible for protecting work from damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 32 18 16 – PLAYGROUND SAFETY SURFACING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Rubberized safety poured-in-place surfacing.

B. Aggregate base materials, geotextile fabric and adhesives.

1.02 RELATED SECTIONS

A. Section 11 68 16 – Play Structures

B. Section 32 13 00 – Site Concrete

1.03 DEFINITIONS

A. Critical Height: Standard measure of shock attenuation.

1. Defined by CPSC No. 325 as: “the fall height below which a life-threatening head injury would not be expected to occur.”

B. Fall Height:

1. Defined by ASTM F 1487 as “the vertical distance between a designated play surface and the protective surfacing beneath it.”

C. Use Zone:

1. Defined by ASTM F 1487 as the “area beneath and immediately adjacent to a play structure or equipment that is designated for unrestricted circulation around the equipment and on whose surface, it is predicted that a user would land from or exiting the equipment.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):

1. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

2. ASTM D624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

3. ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine

4. ASTM D2859 Standard Test Method for Flammability of Finished Textile Floor Covering Materials.

5. ASTM E303 Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.

6. ASTM F1292 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment.

7. ASTM F1487 Standard Test Method for Safety Performance of Playground Equipment for Public Use.

8. ASTM F1951 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.

9. ASTM D297 Standard Test Methods for Rubber Products-Chemical Analysis-Density.

10. ASTM D3389 Abrasion Testing.

B. DIN 1835 Part 6-Permeability to Water.

C. U. S. Environmental Protection Agency Method 3052:1996.

1.05 SUBMITTALS

A. Manufacturer's Product Data and Installation Specification Information for each type of product indicated.

B. Quality Assurance/Control Submittals: Certificate of qualifications of the playground surfacing installer.

C. Samples:

1. Submit one square foot of each specified color of poured-in-place safety surfacing to Landscape Architect no later than one month prior to installation.

D. ASTM E303 Skid Resistance Test.

E. IPEMA Certification: Manufacturer must provide proof of certification. "In the interest of public playground safety, IPEMA provides an independent laboratory which validates a manufacturer's certification of conformance to ASTM F1292-04. A list of current validated products, their thickness and critical heights may be viewed at www.ipema.org."

F. ASTM F1292-99 Impact Attenuation Test Certification for the poured-in-place system to be installed in compliance with the Critical Fall Height as determined by the Playground Equipment to be installed in conjunction with the poured-in-place surfacing system.

G. Quality Assurance/Control Submittals: Certificate of qualifications of the playground surfacing installer.

H. Submit manufacturer's written instructions for recommended maintenance practices.

I. ASTM F1292-99 Impact Attenuation Test Certification for the poured-in-place system to be installed in compliance with the Critical Fall Height as determined by the Playground Equipment to be installed in conjunction with the poured-in-place surfacing system.

J. Compaction test is required for base stone density and must be approved by manufacturer prior to installation of poured rubber surfacing.

1.06 CLOSEOUT SUBMITTALS:

A. Warranty documents specified herein.

1.07 QUALITY ASSURANCE

A. Installer Qualifications:

1. Company using workers who are trained and experienced in necessary crafts and familiar with requirements and methods needed for proper performance of Work in the section.

2. Rubberized Poured-in-Place Safety Surfacing IPEMA certified with no less that 3 completed playground installation of similar size.

a. Provide secondary materials including adhesives, primers, geosynthetics, and repair materials of type and from source recommended by manufacturer of playground surface system materials.

3. Standards and Guidelines: Comply with CPSC No. 325, “Handbook for Public Playground Safety; ASTM F 1292; and ASTM F 1487.

1.08 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at a minimum temperature of 20 degrees F (-7 degrees C) and a maximum temperature of 100 degrees F (38 degrees C).

1.09 SITE CONDITIONS

A. Existing Conditions: Located existing site improvements, underground utility system, and other below grade site improvements in area of surface excavations.

B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground surface system installation to be performed according to manufacturers' written instructions and warranty requirements.

1.10 WARRANTY

A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.

B. Proper drainage is critical to the longevity of the safety surfacing systems. Inadequate drainage will cause premature breakdown of the system in affected areas; and void the warranty.

C. Warranty Period:

1. Rubberized Poured-in-Place Safety Surfacing and Rubberized Tile Surfacing Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of playground surface system that fail in materials or workmanship within 8 years from date of Substantial Completion.

a. Failures include, but are not limited to the following:
1) Reduction in impact attenuation.
2) Deterioration of surface and other materials beyond normal weathering.
3) Puckering, splitting, or folding of material.
4) Seam failure.

PART 2 - PRODUCTS

2.01 RUBBERIZED POURED-IN-PLACE SAFETY SURFACING

A. Rubber Poured-in-Place Safety Playground Surfacing: A synthetic surfacing specifically designed, manufactured, and installed for use as a playground safety surface, consisting of the following:

1. EPDM top layer with impact attenuating pad sublayer; graded according to manufacturer's standard specification for material consistency for playground surfaces and for accessibility according to ASTM F 1951.

2. Impact Attenuation: According to ASTM F 1292.

B. Acceptable Product:

1. flexGround

a. www.flexground.com

Manufacturer's representative: Sandi Walsh
swalsh@flexground.com
office: 916.474.5431
cell: 916.275.3588

b. Color 1 : Sahara Sand

Color 2: Teal

Color 3: Four Leaf Clover

Color 4: Flex Green

Color 5: Seaweed

c. Binder: aliphatic

d. Fall Height at Mound: 3'-0"

Fall Height at Skyport Climber: 10'-0"

Fall Height at Pole Climbers: 10'-0"

C. Colors must be Owner approved.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, subgrade and substrate conditions, drainage, and other conditions affecting performance of the Work.

B. Hard-Surface Substrates: Verify that substrates are satisfactory for unitary playground surface system installation and that substrate surfaces are dry, cured, and uniformly sloped to drain within recommended tolerances according to playground surface system manufacturer's written requirements for cross-section profile.

1. Concrete Substrate:

a. Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by performing procedures recommended in writing by playground surface system manufacturer.

2. Drain Rock Substrate:

a. Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system.

3. Aggregate Base Substrate:

a. Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system.

4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SITE PREPARATION

A. Site Verification of Conditions: Prepare substrates to receive surfacing products according to playground surface system manufacturer's written instructions. Verify that substrates are sound and without high spots, ridges, holes, and depressions.

B. Do not proceed with installation until unsuitable conditions are corrected.

C. Concrete Substrates: Provide sound surface free of laitance, efflorescence, curing compounds, and other contaminants incompatible with playground surface system.

1. Repair unsatisfactory surfaces and fill holes and depressions.

2. Saw cut concrete for terminal edges of playground surface systems as indicated.

3. Treat control joints and other nonmoving substrate cracks to prevent telegraphing through playground surface system.

D. Drain Rock Substrates: Provide sound surface free of laitance, efflorescence, curing compounds, and other contaminants incompatible with playground surface system.

1. Repair unsatisfactory surfaces and fill holes and depressions.

2. Lightly compact drain rock substrate to ensure uniform installation and solid placement.

E. Aggregate Base Substrates: Provide sound surface free of laitance, efflorescence, curing compounds, and other contaminants incompatible with playground surface system.

1. Repair unsatisfactory surfaces and fill holes and depressions.

2. Compact aggregate base to 95%

F. Verify depth of safety surfaces to meet Critical Fall Height of proposed play equipment.

G. Temperature: Temperature must remain above 50 degrees F throughout the installation and curing process.

H. Security: Site must be secured against vandalism throughout the installation and curing process.

3.03 INSTALLATION OF RUBBERIZED POURED-IN-PLACE

A. Comply with playground surface system manufacturer's written installation instructions. Install playground surface system over area indicated in Drawings, and in a thickness to meet critical heights of final equipment locations.

1. Where drain rock or aggregate substrates occur, compact and coordinate review and approval by rubberized poured-in-place safety surfacing manufacturer’s representative prior to installation of other layers.

2. Install padding and wear course according to manufacturer’s recommendations and drawings

3.04 CLEANING AND DEMONSTRATION

A. The contractor shall clean the jobsite of excess materials.

B. The contractor shall instruct the owner's personnel on proper maintenance and repair of all playground safety surfaces.

END OF SECTION

SECTION 32 32 34
REINFORCED SOIL RETAINING WALL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section addresses the gabion faced mechanically stabilized earth (MSE) retaining walls located on plan drawings.

B. Related Sections:

1. Division 01 Section 01 40 00 "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 01 Section 01 35 70 – Buy America Certification Procedures.
3. Division 31 Section 31 22 00 “Grading”, Section 31 23 16 “Excavation”, and Section 31 23 23 “Fill” for subgrade preparation and definitions of structural backfill, gravel backfill for drains, and gravel backfill for walls.
4. Division 31 Section 31 36 00 “Gabions” for gabion baskets.
5. Division 33 Section 33 46 00 “Subdrainage” for pipe underdrain.

1.03 DEFINITIONS

A. MECHANICALLY STABILIZED EARTH (MSE) wall: Retaining wall constructed using layers of geosynthetic to reinforce the retained earth, which is the particular type of reinforced soil retaining wall used in this project.

1.04 PERFORMANCE REQUIREMENTS

A. The walls are designed using the performance requirements and design criteria noted in the contract plans.

B. The contract plans show completed wall designs, with the type of gabion, geogrid type, geogrid maximum spacings, backfill requirements, etc. Substitute wall systems will be considered if they meet the performance requirements for the walls.

1.05 SUBMITTALS

A. Product Data: For gabion baskets and soil reinforcement from manufacturers. The soil reinforcement data will include connection strength test data.

Material Certificates: Also called Manufacturer’s Certificate of Compliance.

B. Geogrid layout: Contractor to provide wall elevation drawings with the geogrid layout shown, meeting the maximum spacing requirements as noted on the plans.

C. Design Submittal: If an alternate wall system is reviewed and approved, Contractor to provide analysis data and working drawings signed and sealed by a qualified professional engineer responsible for their preparation showing compliance with performance requirements and design criteria noted in the contract plans.

D. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

1.06 QUALITY ASSURANCE

A. Pre-Construction Meeting: Review of wall design and construction requirements.

B. Designer Qualifications: A professional engineer registered in the state of Oregon.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery, storage, and handling will be according to manufacturer's instructions.

PART 2 - PRODUCTS

2.01 GEOSYNTHETIC REINFORCEMENT

A. Provide geosynthetic reinforcement as noted or as required by the performance specifications and design criteria.

2.02 BACKFILL

A. Backfill will be as described by the Geotechnical report.

PART 3 - EXECUTION

3.01 EXCAVATION AND FOUNDATION PREPARATION

A. Follow manufacturer's instructions.

B. Contractor to provide all field surveying and layout necessary to construct the project.

3.02 LEVELING PAD INSTALLATION

A. Follow manufacturer's instructions using structural backfill.

3.03 DRAINAGE

A. Install pipe underdrain behind base row as noted in contract plans.

3.04 **REINFORCED BACKFILL PLACEMENT**

A. Follow manufacturer's instructions.

END OF SECTION

SECTION 32 33 00 - SITE FURNISHINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Provide all necessary equipment, labor and materials to complete installation of site accessories as shown on the Drawings, unless indicated as Owner Provided.

1.02 RELATED SECTIONS

A. Refer to the General Conditions, Supplementary Conditions and Division 1 General Requirements.

B. Section 01 35 70 – Buy America Certification Project Procedures

C. Section 01 40 00 - Quality Requirements

D. Section 01 60 00 - Product Requirements

E. Section 32 13 00 - Site Concrete

1.03 SUBMITTALS

A. Product Data: Prior to beginning work submit to the Owner's Representative one set of manufacturer's technical data and installation instructions for each item, with list of accessory items. Clearly indicate options of size, model, color and finish.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

1.04 QUALITY ASSURANCE

A. Installer: Three (3) years experienced installing site furnishings.

B. Manufacturing Standards: Provide each item of equipment as a complete unit produced by a single manufacturer, including fittings, accessories bases and anchorage devices.

1.05 JOB CONDITIONS

A. Field Measurements: Take field measurements prior to installation and notify Owner's Representative of any discrepancies.

B. Locate all underground utilities and modify work as approved to avoid conflicts if applicable. Notify Owner's Representative of unsuitable conditions.

C. Verify the work required to be completed prior to site furnishings being installed in completed and approved. If site furnishings are installed without prior approval, correct the installation as necessary at no cost to the Owner.

PART 2 - PRODUCTS

2.01 BIKE RACKS

A. OCC Outdoor Products: Circle Style Surface Mount Bike Rack

1. Material: Steel tubing with pre-drilling surface mounting plates and tamper-resistant anchoring hardware
2. Color: Black powder coated finish
3. Size: 35" L x 2-1/2" W x 33" H

2.02 BENCHES

A. Landscape Forms: Generation 50 Bench

1. Style: Freestanding cantilever, surface mount, backed with end arms
2. Size: 26" x 72" x 21.5" with angle end arms
3. Material : Aluminum arms and legs with Domestically Sourced Thermally Modified Ash wood, unfinished
4. Color: Matte Black power coated finish
5. Concrete Anchor: 3/8” anchor per manufacturer's recommendation, min. 3” embed.

2.03 LITTER RECEPTACLE

A. OCC Outdoor Products: 36-Gallon Colonial Trash Receptacle with Side Access

1. Material: All-steel, welded construction with vertical slats, fully assembled, surface mounted with tamper-resistant anchoring hardware
2. Color: Black powder coated finish
3. Size: 39” H x 28-1/2” outer diameter

2.04 DRINKING FOUNTAIN

A. Elkay Bi-Level, Tubular Pedestal Barrier-Free Fountain with Pet Fountain, Model LK4420DB.

1. Pedestal steel drinking fountain with powder coat finish, corrosion resistant for outdoor use, with 2 stainless steel, ADA compliant drinking stations and 1 pet bowl.
2. Includes tamper-proof anchor bolts for free-standing surface mount.
3. Includes vandal-resistant bubblers, pushbutton activation, automatic stream height regulator, inlet strainer, water inlet, drain outlet, and access panel.
4. Size: 42” height, 31” width overall
5. Color: Submit color options for approval by Owners Representative.

2.05 SKATE DETERRENT

A. Stainless steel fabricated flat bar doweled into concrete, per drawings.

2.06 DOG SCULPTURE

A. Owner provided.

2.07 CANOE

A. Owner provided.

2.08 MANUFACTURERS

A. OCC Outdoor Products, https://www.occoutdoors.com , T 317.223.8881; occcontact@occoutdoors.com

B. Landscape Forms; www.landscapeforms.com ; T: 800.4430.6209 ; emilyn@landscapeforms.com

C. Elkay; https://www.elkay.com/us/en.html; T: 800-476-4106; CustCare@Elkay.com

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine surfaces or conditions where Site Furnishings are to be erected. Notify the Owner’s Representative of any conditions detrimental to the proper and timely completion of the

work. Do not proceed with installation until unsatisfactory conditions have been corrected and are accepted by the Owner's Representative.

B. Examine units for finish completeness and damage prior to installation. No scratches, dents or any marring of finish will be acceptable.

3.02 INSTALLATION

A. Install work in this section in accordance with the manufacturer's recommendations and as approved by Owner's Representative. Site Furnishings shall be straight and true, plumb and shall not be installed at the angle or slope of the paving on which the items is attached.

B. Identify locations for approval by Owner's Representative prior to installation.

C. Furnishings are to be mounted per details, see drawings.

END OF SECTION

SECTION 32 84 00 - PLANTING IRRIGATION

PART 1 - GENERAL

1.01 SUMMARY

A. Provision for all labor and materials needed for one complete irrigation system. Irrigation systems includes point of connection, controllers, master valves flow sensors, rain sensors, zone valves, distribution piping, spray heads and drip irrigation.

B. Points of connection to water and electrical supplied by the Owner.

1.02 RELATED REQUIREMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections.

B. DIVISON 26 – Electrical

C. Section 31 23 16 - Trenching

D. Section 32 13 00 – Site Concrete

E. Section 32 91 13 – Soil Preparation

F. Section 32 93 00 – Plants and Planting

G. Section 32 97 00 – Plant Establishment and Warranty

1.03 QUALITY ASSURANCE

A. Qualifications: Irrigation Contractor/Installer: Must be a company specializing in work of this section with a minimum of 5 years of documented experience in irrigation installation of a similar nature.

B. Regulatory Requirements: Install irrigation system in accordance with all local, municipal and state laws, rules and regulations governing or relating to any of the work in this section including by not necessarily limited to plumbing and electrical work.

1.04 SUBMITTALS

A. Submit in accordance with Submittal Procedures - 01 30 00.

B. Site Inspection Report: Submit statement confirming a site inspection has been conducted, noting discrepancies between ground measurements and plans, hazards or site conditions which will interfere with installation or operation of the system prior to beginning of work.

C. Product Data: Furnish catalog cuts or other descriptive literature of all specified equipment and materials for approval 30 days prior to installation.

D. Quality Control: The Irrigation Contractor shall be included in the General Contractors Quality Control Plan.

E. Contract Closeout:

1. Submittals:

a. Provide purchase receipts to Owner for the purchase of all Rain Bird products. All Rain Bird products to be purchased from authorized dealer for compliance with redeemable credits.

b. Project Record Documents: During the course of installation, show on a print of the irrigation system Drawings the changes made to the irrigation system during installation including actual locations (horizontal and vertical) of mainline, lateral lines, sleeves, valves, etc. Include all material

or product revisions. Label drawing “Record Copy” and make available for inspection. Do not use in the field.

1) Upon Completion of the work, if possible, provide a record drawing in AutoCAD release 2009 or later including the changes made during construction as Record Irrigation Drawings. Submit in hard copy and digital form for approval and revise if needed with new date. Electronic file is preferred, but not required.

c. Schedule and hold one instructional session for the Owner’s grounds and maintenance employees prior to completion of work. Record and O&M manuals shall be made available for the instructional session. Submit Record drawings per Section 01 78 00.

d. Tools: Submit two sets of controller keys, quick coupler keys and any other unique tools needed to access or operate the system.

e. Zone Map: Submit a laminated irrigation plan sized to fit inside the controller enclosure indicating the various zones, corresponding valve and station on the controller. Valve numbers should match those on the As-built Drawings. Submit for approval.

f. Irrigation Schedule: Submit two copies of the irrigation schedule for approval.

g. Operation and Maintenance Data: Provide three (3) sets of all manufacture's maintenance data sheets, equipment brochures and systems operations information bound in 3-ring binders. Composite data sheets shall have the specific product used on the project clearly identified in colored ink marking.

h. Photo-documentation: Provide to Owner’s Representative photographs of irrigation main and lateral lines located beneath pavement and connections to each planter.

1.05 SITE INSPECTIONS

A. At least 3 working days prior, contact Owner’s Representative to approve the following work. Do not proceed until the work is approved by Owner.

B. Call for inspections for the following:

1. Mark mainline, lateral line routes and valve locations
2. Flag spray head layout
3. All connections / penetrations at leveling curbs, landscape walls and headers
4. Mark all sleeve locations for connection under walks and driveways
5. Trenches, clean and open for pipes and wire
6. Mainline and lateral line pressure tests
7. System flushing
8. Coverage test

1.06 COORDINATION

A. Coordinate with other trades affecting or affected by work of this section.

B. Locate and identify, with visible marking, existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during excavation operations.

C. Do not interrupt existing utilities service facilities occupied and used by the owner or others, except when permitted in writing by the Project Manager and then only after acceptable temporary utility services have been provided

D. Verify that sleeving and other conduits, of sizes and types specified, are installed as required.

E. Prior to the start of work, the Contractor shall verify that the performance and components of the existing site systems are in accord with current jurisdictional requirements and that all necessary components are located as shown on the drawings.

1.07 PROTECTION

A. The Contractor shall handle all components as directed by the manufacturer's handling and installation instructions. Damage from transport or other handling of materials shall be the responsibility of the Contractor.

B. The Contractor shall store and protect all specified components from adverse weather conditions until installation is complete.

C. Pipes and Fittings: Protect from entrance of dirt and debris. Protect plastic piping from direct sunlight. Store to prevent sagging and bending.

D. Protect irrigation materials and system from damage and vandalism before, during and after installation

1.08 CORRECTION PERIOD

A. Repair any settling of backfilled trenches occurring during the one-year correction period at no cost to Owner. Include complete restoration of all damaged planting, pavement and/or other improvements of any kind.

1.09 WARRANTY AND MAINTENANCE / MONITORING:

A. Warranty Period:

1. Maintenance period is 365 days from date of Substantial Completion.

B. Warranty information required:

1. Provide phone numbers, address and e-mail of person or persons responsible for implementing warranty and maintenance work.

2. Repairs are to be made immediately after written notification from Owner. Obtain a certificate indicating the date of Substantial Completion of landscaping.

3. Irrigation equipment damaged by vandalism or resulting from Owner occupancy of the site will not be required to be replaced under the Warranty, unless improper installation is a contributing factor in the damage.

4. Provide spring turn-on to charge the system and fall shut-down to drain system. Blow out irrigation system with air compressor with special attention to drip zones.

5. Coordinate with Owner's Representative for frequency and adjustments to watering times.

6. Provide 5 year manufacturer's warranty for all Controller components.

C. Maintain irrigated landscape areas at the condition accepted at Substantial Completion and as required to establish healthy and viable plantings and against all defects of materials and

workmanship at no cost to Owner including, but not limited to adjustment of nozzles, spray head location and height, trench backfill, pipe depths, leaks, etc.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. As shown on the Drawings or specified.

B. Other Manufacturers: Substitutions as approved by addenda or substitution requests prior to beginning any irrigation installation.

2.02 MATERIALS

A. Pipe and Fittings:

1. Mainline and Laterals: polyethylene Class 40, nipples shall be Schedule 80. Pressure Class (PC) 100. The components shall be polyethylene and meet the following requirements:

   a. ASTM D2104-03 for Polyethylene (PE) Schedule 40 pipe

   b. ASTM D2239 for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.

   c. ASTM F771-99(2005) for Polyethylene (PE) Thermoplastic High-Pressure Irrigation Pipeline Systems.

   d. U.S. Commercial Standard CS-225

   e. National Sanitation Foundation (NSF) approved.

2. Fittings shall be Schedule 80 and conform to the following requirements:

   a. ASTM D3350-06 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

   b. ASTM D2609 for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.

3. Swing Joints at Rotors and Swing Assemblies at spray heads: Rain Bird

4. Sleeving: Schedule 40 PVC, size as noted on Drawings.

5. Steel Pipe: Pipe, nipples and fittings shall be hot dipped galvanized iron or steel, Schedule 40 conforming to ASTM A 120, painted and wrapped.

B. PVC Cement and Primer:

1. Follow Manufacturer's instructions for cementing PVC pipe.

2. For PVC pipe cement use WELD-ON plastic pipe cement, P75 Wet/Dry for PVC gray, heavy bodied, medium set or approved equal.

3. Primer: WELD-ON primer, P-75 Wet/Dry, purple primer or approved equal.

C. Irrigation Sprays & Rotors:

1. Rain Bird RD1800 Series with pressure regulation appropriate for the spray nozzle type, reference Drawings.

2. Rain Bird Falcon Series, reference Drawings.

D. Valves:

1. Irrigation zone control valves: Rain Bird PEB Series.

2. Isolation valves: Watts B6000 brass threaded ball valve - line size
3. Master control valve: Rainbird 200EFB-CP: 2” (50/60), 2” normally, closed 24 volt (wire to controller station 40)
4. Manual Drain Valve: 2 inch Nibco T-311-Y, Class 125 threaded brass ball valve.

E. Vaults and Boxes:

1. Vault for Double Check Valve:
   a. None

F. Valve Boxes:

1. Acceptable Manufacturers:
   a. Rain Bird VB Series (plastic)
   b. Black lids
2. Valve boxes in paving: In-ground, cast iron. Provide for each remote control valve and drain valve.
3. Valve box shall have no more than one valve per box.
4. All valve boxes shall be set flush to finish grade.
5. Extensions shall be used as needed to meet all grades smoothly and evenly.

G. Control Wire:

1. All wiring located under unit paving system shall be located within a separate PVC sleeve from irrigation water lines, size as indicated on the Drawings.
2. Copper, type UL approved UL approved 24-50 volts direct burial, single strand, size per manufacturer, #14 gauge minimum.
3. Irrigation Zone Valve Wire:
   a. Use Red wire for control valve, white for common and blue for spare wires.
   b. Provide one spare control and one spare common wire looped through system.
4. Master Valve Control Wire – on its own circuit:
5. White for control, black for common and yellow as spare.

H. Backflow prevention:

1. Double check type, Zurn Wilkins 950 XL, or approved equivalent.

I. Control System:

1. Rain Bird ESP-12LXMEF

J. Flow Sensor:

1. Rain Bird FS100B
   a. Wiring: PE-39 (6-pair) wires with Rain Bird DB Series Wire Connectors
   b. Provide 36” of slack communication wire in the flow sensing valve box and at the controller.
   c. No splices between flow sensor and controller.

K. Rain Sensor

1. Rain Bird RSD-CEx (Conduit version with extension wire, 1 per each controller)

2.03 OTHER MATERIAL

A. Trace tape (locate wire). All trace wire shall be BLUE colored UF 16 AWG minimum, spliced with Rain Bird DB Series Wire Connectors, 600V. All trace to be placed over main lines only.

B. Sand: clean and suitable for backfilling and bedding pipe.

C. Drain rock: 1/4” to 3/4” cleaned washed pea gravel as sump under valves.

D. Teflon Tape for threaded pipe and fittings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Carefully examine the installed work of all other trades and verify that all such work is complete to the point where this work may properly commence.

2. Call for locates and flag the exact location of all new and existing utilities on site prior to excavation. Repair any utilities, paving or planting damaged in the course of this work.

3. Measure water pressure at point of connection. If the pressure is lower than what is shown on the drawings as the minimum operating pressure, notify the Owner’s Representative immediately and do not proceed with work.

3.02 INSTALLATION

A. Conform to manufacturer's equipment instructions and minimum head spacing.

B. Layout

1. Advise project representative of any discrepancies between drawings and actual ground measurement prior to beginning actual installations.

2. Check correlation between heads and any trees, hydrants, signs, street lights, etc., and notify of any potential conflict.

3. Provide full and complete coverage without overthrow onto non-planted surfaces including walks, roadways, buildings, utility vaults, wall signs, ticket machines, charging stations etc.

C. Excavation and Backfill

1. Safety: Do not begin excavation until arrangements have been made to protect the general public from holes, trenches, parked equipment, etc. Before any excavation is left unattended for any length of time it shall be "safed up" by means of barricades, fence, flagging, warning

2. Keep dirt, debris, rocks, gravel and all other foreign materials from entering the pipes, valves and other equipment.

3. Depth

a. Main Line: as indicated on the Drawings.

b. Laterals: as indicated on the Drawings

c. Trenches shall be kept at a uniform depth unless specified otherwise on the Drawings.

4. Backfill and Compaction

a. Backfill trenches made in structural insulation with mason's sand to fill all voids in trench. Cover backfilled trench with specified geotextile and secure in place

b. Backfill over lines and fittings only after system has been pressure tested and inspected by the Owner's Representative.

5. Protect work at all times from damage by foot and vehicular traffic. Keep rock, soil and all other debris from piping, valves and other equipment.

D. Valves

1. Provide each automatic valve in a valve box. No manifolds.

2. Install plumb and flush to finish grade in a neat and uniform fashion.

3. Automatic valves shall be put in-line with no valves closer than 24 inches apart.

4. All ball valves standard box shall be put in vertical schedule 40 PVC pipe with plastic snug cap lid. (Minimum 4 inches diameter.)

5. Flush mainlines for five minutes before installing valves.

6. Install drain valves on mainlines at low points per Drawings.

7. Attach permanent ID tag to each valve clearly indicating its zone number as installed on the irrigation controller.

8. Locate Rain Bird air-relief valves at high point of each irrigation zone.

9. Locate Rain Bird manual drain valve at terminal header of each drip irrigation zone.

E. Operator Indicator

1. Locate Rain Bird operation indicator at terminal distribution pipe header of each drip irrigation zone.

F. Pipe

1. There shall be no more than 2 lines per trench unless shown otherwise on Drawings. Lines running through paved areas are to be located in common trench with a minimum of 2-inches between each sleeve.

2. When laying two lines in a trench they shall be laid side by side, never stacked.

3. PVC pipe shall be snaked slightly in trenches. Keep pipe marking up and visible.

4. All piping shall be installed with 45 degree and 90 degree angles only.

5. No bends allowed in mainline pipe—straight runs only.

6. Do not install fittings closer than 6 inches any direction.

7. When possible no pipe shall be closer than 6 inches in any direction.

8. Provide 12 inches clear of utilities in any direction.

9. Tape the ends of the pipes to prevent debris from entering

10. Swing joints shall not be installed until after pressure tests.

11. Follow manufacturer's instructions for gluing of joints. Allow joints 24 hours to set up between gluing and application of water pressure.
12. Weld PVC pipe in temperatures over 40 degrees F.
13. Weld PVC pipe under cover in rainy or wet conditions.
14. Only use Teflon tape on threaded pipes and fittings.
15. Fill all open voids at ends of sleeves in landscape planters on structure with specified sealant to provide waterproof seal and to protect from soil entering the sleeve.

G. Wiring

1. In planting beds, lay wire in trenches under pipe.
2. In paved areas, lay wire in sleeves as indicated on Drawings.
3. All wires shall be taped into bundles.
4. All bundles shall be taped every 15 feet.
5. Provide a coil of wire minimum 24 inches long at controller and at valve.
6. Provide a 12-inch expansion and contraction loop at every valve box, corner, at entry and exits of sleeves and at in at every 100 feet of wire length in the trench.
7. There shall be no splices in the wire in the systems except at valves and controller. Any splice must be waterproof.
8. Provide (1) extra control wire making a circuit to all valves
9. Provide (1) one extra wire (blue) making a circuit to all valves.
10. Label wires at controller and at splice box before entering the building.
11. Transition wires to multi-strand at splice box before entering the building.
12. Place locating tape along all mainline, lateral lines and wiring in sleeves.

H. Sleeves

1. All pipe and wire installed under any paved surface, road, walk, path, curb, wall, stair, etc. shall be sleeved.
2. Tape the ends of sleeves to prevent debris from entering
3. Backfill: clean sand
4. Cover: geotextile fabric to cover sand in backfilled trenches cut out of structural insulation under pavement.
5. Mark sleeves the concrete tacks at all paved areas.
6. Extend sleeves 12 inches beyond, paving, curbs, wall etc.
7. Fill gaps between irrigation lines and sleeves at locations inside of landscape and stormwater planters on structure to prevent moisture and soil from entering sleeve. Apply foam per manufacturer’s recommendations to avoid overfilling openings that could cause buckling or stress cracks on piping.

I. Sprinkler Heads

1. Use bottom inlet only of sprinkler head.

2. All heads shall be installed on 3-way swing joints / swing assemblies.

3. All heads shall not be located closer than 3 inches from walkway or curb.

4. All swing joints / assemblies shall be made of schedule 40 PVC, Rain Bird brand

5. All swing joints shall be made of the same size pipe as the inlet on the head.

6. All swing joints at end of line shall be PVC 90 degree slip thread thin polyethylene nipple.

7. All heads next to sidewalk or curbs shall be 1/2 inch to 1 inch below level of walk or curb wherever practical.

8. All heads in the center of shrub beds shall be 1 inch to 1-1/2 inches above final grade.

9. Heads to have PRS pressure regulating screens if recommended operating pressure is exceeded.

J. Flow Sensor: To ensure adequate operation at low volumetric flow ranges (GPM), size pipe small enough to ensure that the linear (ft/sec) flow rate equals or exceeds the 1 ft/sec minimum. To minimize water turbulence before and after the flow sensor, use 10X pipe diameter in pipe length prior to the flow sensor and 5X pipe diameter immediately following the flow sensor. Pipe distances should be unobstructed and without turns.

K. Isolation Valves:

1. Provide mainline isolation valves to divide the main line into manageable segments.

2. Review locations of isolation valves with Owner’s Representative prior to installation.

L. Winterization:

1. Provide drain valves at low points of mainline. Also use air compressor to blow out system each winter with special attention given to drip zones.

3.03 FIELD QUALITY CONTROL

A. Flushing System: Flushing to be observed by the Owner’s Representative as follows:

1. All lines are to be flushed after swing joints / assemblies are installed.

2. After all new irrigation piping and risers are in place and connected, all necessary division work has been completed and prior to installation of irrigation heads, all control valves shall be opened and a full head of water used to flush out the system completely. Flush until water flows clear and no debris is caught in a fine mesh strainer placed over each of several outlets.

3. All heads shall be installed immediately after flushing for five minutes.

B. Tests: Pressure testing be observed by the Owner’s Representative as follows:

1. Notify Owners representative at least 3 working days prior to testing. The Owner's Representative must be present for all pressure testing.

2. Use test equipment in good condition and test equipment will have no leaks at couplings that might compromise test procedure.

3. After flushing is complete and zone valves are installed, test main and lateral lines at 100 PSI. System will pass when it maintains test pressure for 1hour.

4. Any leaks will be corrected and the test will begin anew.

5. Test shall be performed with all fittings, valves, connections, couplings and all other connection points exposed until the completion and acceptance of the pressure test.

C. Coverage Testing:

1. Notify the Owner's representative 3 working days prior to the performance of the Coverage test. The Owner's Representative must be present for the Coverage testing.

2. After system is 100 percent installed, performed a water coverage test to determine whether water coverage and operation of the system is adequate for planting, without areas of excessive flooding, dry spots, areas of insufficient overlap, or excessive over spray. If system is determined by Owner's Representative to be inadequate due to Contractor's poor workmanship or materials, it shall be rejected or repaired at the Contractor's expense and both pressure and coverage tests repeated until accepted.

D. Manufacturer's Field Service:

1. Engage a factory-authorized Rain Bird service representative to inspect, test and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing to Owner's Representative.

2. Contact: Jerry Palmerton

   a. Rain Bird Corporation

   b. (208) 494 4917

   c. JPalmerton@rainbird.com

E. Clean up:

1. Area shall be kept reasonably free of debris at all times.

2. Upon completion, all debris shall be removed.

3. Upon completion, all walks and roadways shall be swept and washed. If washed, great care must be made to insure sediments are not carried into the storm drain system.

4. Upon completion, all excess dirt, rock and other materials shall be removed from site.

F. Final Inspection:

1. Thoroughly flush, clean, adjust and balance the entire irrigation system for complete coverage and efficient operation. Set head to avoid overspray. Set up control wires to operate in an organized clockwise pattern. With 5 days' notice to Owner's Representative, demonstrate the entire system showing the successful function of all the controls, valves, sensors, heads.

END OF SECTION

SECTION 32 91 13 - SOIL PREPARATION

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

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

1.02 SECTION INCLUDES

A. This Section specifies planting soil preparation required for planting, and grass seeding and sprigging.

B. Work of this Section includes:
   1. Soil amendments: Furnish and install.
   2. Fertilizers and conditioners: Furnish and install.
   3. Topsoil: Prepare and incorporate into planting soil.
   4. Furnishing all labor, materials and equipment for testing, preparation, and placement of planting soil, water quality media, green roof media, and compost as indicated by the drawings and as specified.
   5. Coordinate placement of planting soil and required soil amendments with the establishment of rough grades.
   6. Coordinate depths of soil amendments and planting soil with grading specifications for rough and finish grades.

C. All rough grading operations shall be completed as required by these specifications. planting soil placement or backfilling in areas to be landscaped shall not occur until the Owner's Representative has issued written approval of the rough grade and topsoil.

1.03 DEFINITIONS

A. Soil classifications standards used herein for existing and imported soils include but are not limited to the following.
   1. ASTM Soil Quality Standards.
   2. Classification: ASTM D 2487-00.
   3. Gradation of Soils: ASTM D 422-63 (1998).
   4. Liquid Limit and Plasticity Index: ASTM D 4318-94(2001)e1.
   5. Moisture-Density Relations: ASTM D 1557-00.
   6. Permeability of Soils: ASTM D 2434-68(2000).

B. ASA: American Society of Agronomy.

C. CEC: Cation exchange capacity.

D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

E. Finish Grade: Elevation of finished surface of bark mulch, or planting soil in absence of mulch.

F. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

G. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.

H. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter".

I. Planting Soil: Imported topsoil or manufactured topsoil modified to become topsoil; mixed with soil amendments.

J. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

K. Subgrade Soil: Friable soil, free from contaminants and materials deleterious to plant growth to depth as specified.

L. Surface Soil: Soil that is present at the top layer of the existing soil profile or just below the duff layer, if present. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

M. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil.

1.04 SUBMITTALS

A. General: For each unalike material, submit the following:
   1. Samples:
      a. Submit, as required by laboratory, directly to laboratory. Identify each sample by soil mix type and intended plant material.
      b. Submit one-quart bags to Landscape Architect with recommendations for amendments per planting type.
   2. Soil testing analysis: Submit results of analysis.
   3. Manufacturer's certified analysis: Submit with packaged standard products.

B. At least 7 working days prior to use on site or the start of work, the Contractor shall submit the following information to the Owner’s Representative. All product samples must include sufficient volume for the Owner’s Representative to make a reasonable analysis.
   1. Certified Analysis:
      a. All compost mixture components required by these specifications or as required by testing laboratories to bring soil into compliance with these specifications. All samples must be tested within six months of anticipated use.
      b. All fertilizer mixes required by the specifications or as required by testing laboratories to bring soil into compliance with these specifications.
      c. All on-site or imported topsoil, planting soil, green roof media, or water quality soil media required by these specifications. All samples must be tested within six months of anticipated use.
   2. Where any tests show results failing to conform to the required standards the Contractor shall include with the testing report a recommended treatment plan to bring the material into conformance.
   3. Available Testing Laboratories:
      a. Soil and Plant Laboratory, Inc. – 503-557-4959.
      b. Western Agricultural Laboratories – 503-968-9225.
   4. Product Samples:
      a. Planting Soil Mixture(s).

1.05 QUALITY ASSURANCE

A. Standards: Follow the specifications and recommendations of the American Association of Nurserymen (AAN), ASTM D5268, and applicable local agencies.

B. Laboratory Qualifications:
   1. An independent, state-operated, or university-operated laboratory
   2. Experienced in soil science, soil testing, and plant nutrition
   3. Agency with the experience and capability to conduct the testing indicated
   4. Specializes in types of tests to be performed.
   5. Soil testing shall be conducted by Testing Agency approved by Project Director/COR.

C. Required Analysis:

1. Manufacturer's literature and laboratory tests are required to determine that the following soil quality and additives meet requirements of this Section for the following:
   a. Organic amendments.
   b. Commercial fertilizers.
   c. Chemical additives.
2. Topsoil Analysis:
   a. Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; USDA Soil Texture Classification, cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
   b. Topsoil Analysis Report must include analysis of suitability of topsoil for plant growth. State recommended quantities of nitrogen, phosphorus, and potash nutrient, soil conditioners and soil amendments to be added to produce satisfactory topsoil.
   c. Soil fertility recommendations in the form of application rates of individual chemical amendments for each soil tested. And for each plant community?
   d. Soil mechanical analysis: Soil particle size analysis (% sand, % silt, % clay, and % gravel).
   e. Soil organic content.
3. Compost Analysis:
   a. Furnish compost analysis by a qualified testing laboratory stating percentages of organic matter, moisture content, and inert contaminants; soluble salt content; gradation; deleterious material; pH; and maturity.
   b. Compost Analysis Report must include analysis of suitability of compost for plant growth. State volumes and quantities of recommended amendments necessary to produce satisfactory compost.

D. Recommendations:
1. Based on the test results, document and submit recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil(s) suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
2. Provide documentation to the Owner’s Representative at least 7 working days prior to use on site or the start of work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manner to protect them from damage and contamination.

B. Store products in manner to protect them from damage and contamination, and to comply with manufacturer's storage instructions.

C. Packaged Materials:
1. Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.

D. 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. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates

1.07 PROJECT CONDITIONS

A. Site Familiarization: Contractor is responsible for becoming familiar with site in relation to work of this Section and associated work in other parts of the Contract Documents.

B. The Contractor shall prepare topsoil only when weather and soil conditions allow. Do not attempt soil preparation work when weather or soil conditions would contribute to poor or improper mixing, voids, or other adverse conditions.

C. Subgrades: Verify that subgrade allows for placement of planting soil mix directly on to native soil. Sub-grade shall be free of unsuitable material such as stumps, roots, rocks, concrete, asphalt, or metals, for a minimum depth of 6 inches.

D. Finish Grades: Contractor is responsible for bringing all areas to finished grades as indicated on Construction Drawings. Any variations or disturbances to the fine grading shall be corrected by the Contractor.

E. The Contractor shall take all reasonable precautions to prevent runoff of topsoil and fertilizers from leaving site or entering storm systems, or any waterway.

1.08 SEQUENCING AND SCHEDULE

A. Coordinate soil preparation work with installation of other site improvements and planting of trees, shrubs, ground covers and lawns.

PART 2 PRODUCTS

2.01 PLANTING SOIL MIXES

A. General:

1. Planting soils can be any combination of topsoil, sand, organic matter, inorganic soil conditioners, or fertilizer to create the specific planting soil types specified below.
2. Nutrient analysis and amendment: Unless specific amounts of chemical amendments are given in specification, the mix shall be tested for levels of pH, iron magnesium, potassium, phosphorous, salts, carbon, and nitrogen, and shall be adjusted to required fertility levels.

a. The following are acceptable results for all soil types.**)**

pH Range	5.5 to 7.0
Magnesium-Mg	100+ units
Phosphorous-P205	150+ units
Potassium-K20	120+ units
Carbon Nitrogen Ration-C/N	Max 30:1
Soluble Salts/Conductivity	Not to exceed 500 ppm/0.5 mmhos/cm (organics less than 5%), not to exceed 3000 ppm/2.5 mmhos/cm (organics greater than 5%)

b. Analysis for nutrient levels and toxic elements by parts per million including nitrate nitrogen, and extractable phosphorus, potassium, magnesium, manganese, iron, zinc, copper, boron, sulfate, calcium, molybdenum, sodium, aluminum, arsenic, cadmium, chromium, cobalt, lead, lithium, mercury, nickel, selenium, silver, strontium, tin, and vanadium. Nutrient tests shall include testing laboratory recommendations for supplemental additions to soils as calculated by amount of material to be added per volume of soils for type of plants to be grown in the soil.

c. Soil fractions shall be those defined by local Soil Conservation Service or similar entity. Soil fractions are by weight of mineral fraction without organics.

d. Percent organic matter as determined by total organic carbon, and total nitrogen. Test samples shall be oven dried to a constant weight at a temperature of 105 degrees C.

e. Soluble salt by electrical conductivity of a saturated paste extract measured in millimho per cm, soluble calcium, magnesium, potassium, sodium, sulfate, chloride, nitrate, and boron.
f. Determination of plant available nutrients and non-essential minerals tested by ammonium bicarbonate Diethylene Triamine Penta-acetic acid (AB DTPA) described in Methods of Soil Analysis, Part 3 Chemical Methods, Soil Science Society of America, Inc. 1996.
g. Saturated Hydraulic Conductivity Test - USDA Handbook Number 60, method 34b or other approved methods.
h. Provide certification that no toxic materials are in any soils or amendments.
i. Unit weights shall be measured as wet density at 100 percent compaction and optimum moisture; reference ASTM D698.

3. Free of stones 1 inch or larger in any one dimension and other extraneous materials harmful to plant growth.
4. Thoroughly combine all ingredients to create homogeneous planting soil mixtures prior to placement on subgrade.

B. Planting Soil Mix for Turf and Lawn Areas:
1. Imported, coarse sand, and compost to make a new soil that meets the Project goals for the indicated planting area.
2. Mix Ratio:
a. Total composition of mineral fraction:
1) Sand: 40-60 percent (50% average)
2) Topsoil: 30-50 percent (40% average)
3) Compost: 5-15 percent (10% average)
b. Organic content: 3-5 percent.
c. General requirements as defined for general soil mixes.

C. Planting Soil Mix for Trees, Shrubs, and Groundcovers:
1. Imported topsoil, coarse sand, and compost to make a new soil that meets the Project goals for the indicated planting area.
2. Mix Ratio:
a. Total composition of mineral fraction:
1) Sand: 50-60 percent (55% average)
2) Topsoil: 30-40 percent (35% average)
3) Compost: 5-15 percent (10% average)
b. Organic content: 4-6 percent.
c. General requirements as defined for general soil mixes.

D. GROWING MEDIUM AT STORMWATER FACILITIES
1. See Section 33 46 00 – Stormwater Management for requirements for growing medium at stormwater facilities.

2.02 IMPORTED TOPSOIL

A. Topsoil shall be imported and unamended soil from sources approved by the Owner's Representative. Topsoil shall be from sources that are naturally well-drained sites where topsoil occurs at least 4 inches/100 mm deep, not from agricultural land, bogs, or marshes.

B. Additional properties of imported soil before amending to make planting soils:
1. Acidity range (pH) of 5.5 to 7
2. Minimum of 4 percent organic-matter content
3. Friable
4. With sufficient structure to give good tilth and aeration.

C. Thoroughly clean topsoil of the following unacceptable properties:

1. Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
2. Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8 percent by dry weight of the imported soil.
3. Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 1 inches/25 mm in any dimension. Might want to add “excessive aggregate base rock material”?
4. Disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.

2.03 SUBGRADE SOIL

A. Friable soil, free from contaminants and materials deleterious to plant growth to depth as specified in Part 1 – General, Project Conditions.

2.04 ORGANIC MATTER

A. Sphagnum Moss.

B. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
   1. >50% on Maturity Index at dilution rate appropriate for compost application.
   2. pH range of 5.5 to 8.
   3. Soluble salt content of 5 to 10 dS/m.
   4. Moisture content 35 to 55 percent by weight.
   5. Organic Matter Content: 50 to 60 percent of dry weight.
   6. 100 percent passing through ½ inch/12 mm sieve.
   7. Not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.
   8. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
   9. Provide certification that no toxic materials are present in compost.

C. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.

D. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

E. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

F. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

G. Leaf Mold: Thoroughly shredded, composted leaf material.

2.05 CHEMICAL AMENDMENTS

A. Dolomite: for bidding assume planting and seeding beds and areas be amended with 2” of compost tilled into the top 6” of finished grade.

2.06 INORGANIC SOIL CONDITIONERS

A. Lime: Agricultural grade mineral soil conditioner ASTM C 602, agricultural limestone containing 35 percent minimum magnesium carbonate and 65 percent calcium carbonate, 100 equivalent and as follows:
   1. Class: Class T, with a minimum 99 percent passing through No. 8 sieve and a minimum 75 percent passing #65 through No. 60 mm sieve.
   2. Provide lime in form of ground dolomitic limestone.

B. Iron Sulfate (Ferric or Ferrous): Granulated ferrous sulfate containing a minimum of 20 percent iron, and 10 percent sulphursulfur. Shall be supplied by commercial fertilizer supplier.

C. Sulphate of Potash: Agricultural grade containing 50 percent of water soluble potash.

D. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Aluminum Sulfate: Commercial grade, unadulterated.

G. Single Superphosphate: Commercial product containing 20 percent available phosphoric acid.

H. Calcium Nitrate: Agricultural grade containing 15-1/2 percent nitrogen.

I. Urea Formaldehyde: Commercial product containing 38 percent nitrogen.

J. Diatomaceous Earth: Calcined, diatomaceous earth, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

K. Calcined Clay: An inorganic soil amendment formed by expanding clay at high temperatures (calcining), and used to alter soil strength by affecting its ability to retain moisture.

L. EarthLite Fiter Media, as manufactured by Sunmark Seeds; 1.888.214.7333; Contact – Robin Cook.

M. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

N. For bidding assume placement and incorporation of 35 lbs of dolomitic lime per 1,000 square feet.

2.07 FERTILIZERS

A. Potash: Potash shall be derived from muriate of potash containing 60 percent potash for each use.

B. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

C. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

D. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition:
      a. 16 lbs per 1,000 sq. feet of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
      b. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

E. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
   1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
   2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency. If we have this, we would not need or want 1?

F. For bidding assume 10 percent nitrogen, 6 percent phosphorus, and 4 percent potash by weight. At least 50 percent of total nitrogen shall contain no less than 3 percent water-insoluable nitrogen. At least 60 percent of nitrogen content shall be derived from super-phosphate containing not less than 18 percent phosphoric acid or bone meal containing 25 percent – 30 percent phosphoric acid and 2 – 3 percent nitrogen. Potash shall be derived from muriate of potash containing 55 – 60 percent potash.

2.08 MINERAL AMENDMENTS

A. Sand:
   1. Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C33/C33M.
   2. Coarse sand derived from crushed basalt, granite, or quartz.
      a. Beach, river, or other smooth sands will be rejected.
   3. Grading Dry Weight Basis:

Percent Passing	Sieve Designation
100	10 mm (3/8 inch)
95-100	2.00 mm (#10)
20-80	0.41 mm (#40)
0-5	0.075 mm (#200)

   4. Chemical Properties:
      a. Salinity: Saturation extract conductivity shall not exceed 3.0 milimhos/cm.
      b. Boron: Concentration in saturation extract shall not exceed 1.0 parts per million.
      c. Sodium Absorption Ratio (SAR), as calculated from analysis of saturation extract, shall not exceed 6.0.

2.09 HERBICIDES

A. Pre-emergent and post-emergent herbicides shall be as directed for condition by currently licensed herbicide applicator

2.10 WATER

A. Water shall be suitable for irrigation, free from oil, acid, alkali, salt or other substances harmful to plant life.

PART 3 EXECUTION

3.01 INSPECTIONS

A. The Contractor shall examine the entire site for conditions that will adversely affect execution, permanence and quality of work, and survival of plant materials. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify the following items are in place and have been accepted by the Owner's Representative: Subgrade compaction and grades, landscape walls, steps, planters, and other hardscape elements.

C. Examine subgrade and rough grading before soil preparation. Alert Owner's Representative to unacceptable rough grading or subgrade.

D. The Contractor shall verify that rough grades and slopes of areas to be planted areas are set at sufficient depth to allow for placement of specified materials. If the site is not suitable for landscaping operations, the Contractor shall perform necessary corrective work.

E. Proceed with placement only after unsatisfactory conditions have been corrected.

3.02 SUBGRADE PREPARATION

A. General: Within the entire area to be landscaped, the Contractor shall complete the following subgrade soil preparation items to eradicate existing weeds and natural groundcover. Initiate planting soil preparation as stated herein and coordinate work with irrigation system and utility lines.

B. Weed eradication shall include herbicide and non-herbicide methods. Eradication shall include and is not limited to elimination of the following invasive species and weeds:
   1. Cirsium arvense (Canadian Thistle).
   2. Convolvulus spp. (Morning Glory).

3. Cytisus scoparus (Scotch Broom).
4. Dipsacus sylvestris (Common Teasel).
5. Equisetum spp. (Horsetail).
6. Festuca arundinaceae (Tall Fescue).
7. Hedera helix (English Ivy).
8. Holcus canatus (Velvet Grass).
9. Lolium spp. (Rye Grasses).
10. Lotus corniculatus (Bird's Foot Trefoil).
11. Lythrium salicaria (Purple Loose Strife).
12. Melilotus spp. (Sweet Clover).
13. Myriophyllum spicatum (Eurasian Milfoil).
14. Phalaris arundinaceae (Reed Canary Grass).
15. Rubus discolor (Himalayan Blackberry).
16. Solanum spp. (Nightshade).
17. Trifolium spp. (Clovers).

C. Herbicide application shall be by manual 'spot spraying', wicking, or backpack methods per manufacturer's specifications.

D. Herbicide application shall be as directed by a currently licensed applicator and shall be strictly applied by manufacturer's specifications, and applicable codes and regulations.

E. Remove invasive plant material after herbicide application has effectively stopped plant growth. Dispose legally off-site.

F. After initial spraying and removal of weeds, and prior to placing topsoil, the contractor shall water the subgrade sufficiently to germinate dormant weed seeds.

G. The Contractor shall verify that invasive species and weeds have been eliminated prior to the placement of planting soil. The Contractor must not place planting soil until all living weed matter has been eliminated.

H. Prepare areas to be landscaped by clearing weeds and groundcover, stumps, stones larger than 1 inch in diameter, roots, and debris or materials that may hinder proper grading, tillage, planting, or subsequent maintenance operations by approved means. Cleared material shall be totally removed from project site and legally disposed off the property.

I. 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 subgrade soil.

J. Verify that subgrade allows for placement of planting soil mix directly on to native soil. If subgrade has materials that will hinder plant growth or is deleterious to health of the plant material contractor will over-excavate and place suitable subgrade soil to allow for a minimum 30 inches of total soil depth, including planting soil.

K. Subgrade Preparation: The Contractor shall eliminate uneven areas and low spots. Subgrade of planting areas shall be loosened or scarified to a minimum of 3-inch depth prior to spreading planting soil. Subgrade shall be brought to true and uniform grade and shall be cleared of stones greater than 1 inch, sticks, and other deleterious and extraneous materials.

L. Apply 20/10/5 fertilizer at a rate of 6 lbs. per 1000 sf directly to subgrade before loosening.

M. Rototill a 4-inch layer of subgrade material associated with planting areas with a 50/50 mix of existing subgrade soil and planting soil.

3.03 PLANTING SOIL PLACEMENT

A. Verify that planting soil is stockpiled in sufficient quantities to be placed at depths specified. The Contractor shall notify the Owner's Representative immediately if supplies are inadequate or do not meet specifications for planting soil. The Contractor shall provide imported planting soil meeting the requirements of this section if the supply of existing on-site topsoil to create planting soil is insufficient.

B. General:
   1. Place planting soil in locations and to depths shown on drawings or on schedules. Select placement and compaction methods that will not damage or dislodge drainage or irrigation systems.
   2. Do not use muddy or frozen material.
   3. Layering: If depth of planting soil exceeds 36 inches, place in multiple lifts of 6 inches or less. Tamp each layer only enough to eliminate air pockets and to control settling. Do not over compact; soil shall be free draining. Overfill deep placements to allow for settlement. Repair settled areas and uneven areas at end of guarantee period.

C. For Turf and Lawn Areas:
   1. Verify subgrade elevations, and correct discrepancies.
   2. Spread planting soil mix to depths specified herein in planting beds but not less than required to meet finish grades after natural settlement.
   3. Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades

D. For Trees, Shrubs, and Groundcover Areas:
   1. Spread planting soil mix to depths specified herein in planting beds but not less than required to meet finish grades after natural settlement.
   2. Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades

3.04 MULCHING

A. General: Immediately install minimum 1-inch temporary mulch layer in tree, shrub, and groundcover areas as erosion control. In areas where final mulch materials match requirements of this Section, the temporary layer may remain in place as part of the final mulch layer.

B. Following plant material installation bring mulch layer up to a minimum of 3 inches prior to substantial completion.

3.05 PREPLANTING FERTILIZATION

A. General: Apply preplant fertilizer at the following rates. Apply not more than seven days before planting. Work well into soil:

Trees	1 lb per 2 inches of trunk diameter, mixed throughout tree pit backfill
Shrubs	1/4 lb per 12 inches of height or spread; or 5 lb per 100 square feet of bed for massed plantings
Groundcovers and Herbaceous Plants	3 lb per 100 sq feet of bed area
Turf and Lawn	100 lb per acre

3.06 CLEANUP

A. Keep project site free from accumulation of debris, soil, and other material.

B. At completion of each area of work, completely remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off site unless otherwise indicated.

C. Any paved area or surfaces stained or soiled from landscaping materials shall be cleaned with a power sweeper using water under pressure. Building surfaces shall be washed with proper equipment and materials as approved by the Owner’s Representative.

3.07 PROTECTION

A. General: Protect and avoid damage to existing utilities and to other site work in place.

B. Stabilization: Protect planting areas in a manner to safeguard in-place planting soil from additional compaction, disturbance, and contamination,. Prohibit the following practices within these areas except as required to perform planting operations:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Vehicle traffic.
   4. Foot traffic.
   5. Erection of sheds or structures.
   6. Impoundment of water.
   7. Excavation or other digging unless otherwise indicated.
   8. Cleaning of tools and implements.

C. If planting soil or subgrade is over compacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by the Owner's Representative and replace contaminated planting soil with new planting soil.

3.08 PLACEMENT SCHEDULE

A. Place soil mixes according to plans and the following table:

Location	Mix	Depth
Turf and Lawn Areas	Lawn Mix	6 inches
Tree,Shrub and Groundcover BedsAreas	Shrub and Tree Mix	24 inches
Tree Pits	Shrub and Tree Mix	Per Drawing detail

END OF SECTION 32 91 15

SECTION 32 92 00 - SEEDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Provide all material, labor, equipment and services necessary for the furnishing and installation hydroseeded lawn.

1.02 RELATED SECTIONS

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

B. Section 01 35 70 - Buy America Certification Procedures

C. Section 01 40 00 - Quality Requirements

D. Section 01 60 00 - Product Requirements

E. Section 01 57 13 – Temporary Erosion and Sediment Control

F. Section 32 84 00 - Planting Irrigation

G. Section 32 91 13 - Soil Preparation

H. Section 32 97 00 - Landscape Warranty & Maintenance

1.03 DEFINITIONS

A. Finish Grade: Elevation of finished surface of topsoil.

B. 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.

C. 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.

D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 91 13, Soil Preparation and drawing designations for planting soils.

E. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.04 SUBMITTALS

A. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

B. Certification of Grass Seed: From seed vendor for each grass-seed or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod Include identification of source and name and telephone number of supplier.

C. Qualification Data: For qualified landscape Installer.

D. Maintenance Manual: Submit maintenance guidelines for turfgrass. Provide instructions for plant placement, pruning, watering, mowing, fertilization, weeding, disease and pest control, and plant replacement.

1. Include product data sheets in manual, along with maintenance instructions and parts lists for those products.

2. Include maintenance record calendar and schedule of tasks.

E. Integrated Pest Management Plan (IPM): Submit IPM for specified plants including schedule of recommended pest control.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.

2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."

3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

4. Personnel Certifications: Installer's field supervisor shall have certification in one of all of the following categories from the Professional Landcare Network:

5. Certified Turfgrass Professional designated CTP.

6. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

7. Pesticide Applicator: State licensed, commercial.

B. Pre-installation Conference: Conduct conference at Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other 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, as applicable.

B. In addition to the labeling requirements of the Oregon Seed Law, label all native seed containers with the date and location of where the original stock seed originated. Seed whose origin cannot be traced may not meet the definition of "native". For native seed collected for direct use on a Project, label containers with the date and field location of collection of each seed type.

C. 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, lime, and soil amendments with appropriate certificates.

1.07 SUBSTANTIAL COMPLETION

A. Substantial completion is achieved after the Contractor has installed all turfgrass and associated materials and provides Owner's Representative with a written request to inspect the work. Turfgrass areas will be considered substantially complete when in compliance with the following conditions:

1. Turf: Healthy, free of pests and disease, and with 95 percent cover and no bare areas greater than 5 inches square.

2. Roots: Turfgrass roots thoroughly knitted to the soil.

PART 2 - PRODUCTS

2.01 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed will be delivered in sealed containers and labeled, particularly for species, location obtained, weight of each species, presence of Noxious Weeds, percent germination and date of testing, and other items.

C. Must be tested within 18 months of delivery to site.

D. Seed must be plump, not sprouted, not moldy or otherwise damaged.

E. Each lot of seed is subject to inspection when delivered.

F. Grass Seed Mix: Proprietary seed mix as follows:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Hobbs and Hopkins; Pro-Time lawn Seed; 303 Sun Mix

2.02 FERTILIZERS

A. As recommended by soil lab tests. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from soil-testing laboratory.

2.03 MULCHES

A. Mulching material shall be wood cellulose fiber mulch, containing no growth or germination inhibiting factors. The material shall be clean, weed-free, and contain a non-toxic green dye to aid in visual inspection after application. The fibrous mulch shall form an absorptive mat allowing moisture to percolate into underlying soil but not inhibiting seed germination and plant development.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

2.04 TACKIFIER

A. Dry Powder Tackifier made from non-synthetic (organic) material for slurry application. Material is to be nontoxic and free of plant-growth or germination inhibitors. The emulsion shall,

when diluted with water and upon drying, allow exchange of air and moisture to the seeds and have an effective life of at least three months.

B. Tackifier base consisting of one or more active hydrocolloids from natural plant sources, which hydrates in water and blends with other slurry materials, and upon application and drying tacks the slurry particles to the soil surface, and exhibits no growth or germination inhibiting factors. Provide stabilizing emulsion in a dry powder form that may be re-emulsifiable, and consisting of a processed organic adhesive derivative of one of the following

1. Gumbinder derived from guar (Cyamopsis tetragonoloba)

2. Gumbinder derived from plantain (Plantago insularis)

2.05 SEEDING ACCESSORIES

A. Hydroseed Equipment: Use hydraulic equipment that continuously mixes and agitates the slurry and applies the mixture uniformly through a pressure-spray system providing a continuous, non-fluctuating delivery. Ensure the equipment and application method provides a uniform distribution of the slurry. Place seed, fertilizer, mulch, and tackifier in the hydroseeder tank no more than 30 minutes prior to application.

B. Water shall be potable and free from any impurities that could inhibit seed germination or otherwise adversely affect plant growth.

2.06 PESTICIDES

A. Pesticides are prohibited unless expressly allowed by Owner.

1. Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

2. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

3. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.07 WATER

A. Water shall be free from oil, acid, alkali, salt and other substances harmful to growth of grass, and shall be from a source approved by Owner's Representative prior to use.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to be seeded for compliance with requirements and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION & PROTECTION

A. Before seeding, obtain Owner's Rep. acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

B. Seeded areas are to be weed free before hydroseeding.

C. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.

2. Protect grade stakes set by others until directed to remove them.

D. 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.

E. As required due to weather, protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch and roll surface smooth.

3.03 SCHEDULING

A. Proceed with seeding only when appropriate forecasted weather conditions permit. Seeding shall be performed during periods, which are most favorable for the germination of seed and the establishment of a healthy stand of vegetation, as determined by the season, site conditions, local weather conditions and accepted practice. Do not hydroseed under the following conditions:

1. Temperatures to be below what is required for germination and growth within one month.

2. Temperatures forecast to be over 90 degrees within two weeks.

3. Winds forecast to be over 30 mph within two weeks.

4. Current the wind velocity exceeds 5 MPH.

5. Rains forecast to be over ½" per hour within two weeks.

6. Soggy soils beyond the capacity to support a person without foot-printing.

7. Standing water on site.

3.04 HYDROSEEDING

A. Hydroseed all areas of site as indicated on the plans and areas disturbed by construction, unless other treatment is specifically indicated on the drawings.

B. Do not seed against walls, stairs, trees, shrubs etc. Limit extent of seed to outside edge of planting saucer.

C. Apply 100% ground coverage.

D. Record all material quantities for each batch of hydroseeding mixture and results provided to the Owner's Representative.

E. Two-Step Operation - Apply slurry uniformly to all areas to be seeded in a two-step process. Apply according to the following:

1. Step 1 – Together apply seed per recommended rate, apply fertilizer at soil test recommendations suggestion application rate, and hydromulch at 500 lbs per acres.

2. Step 2 - Apply slurry coat of hydromulch at 1,000 lbs per acre and tackifier at 100 lbs per acre (or as recommended by manufacturer for slope gradients present on site). Apply while soil is moist.

F. Combine materials in the agitation tank of the hydraulic seeder and thoroughly mixed to form homogenous slurry. Place only enough material into the hydroseeder to adequately seed an approved area.

G. Seed that has been in the agitation tank more than 2 hours will be considered unusable and shall not be applied.

H. Apply mixture through a pressure-spray distribution system that provides a continuous, non-fluctuating discharge of the mixture in the above quantities uniformly on the areas to receive seed.

I. Uniformly apply the slurry to the areas indicated on the Drawings in a minimum of two and a maximum of three passes. Ensure that the application rates are adhered to and that uniform spraying takes place.

J. Prevent over-spray of trees, shrubs, roads, pathways, finished surfaces and fixtures. Clean up over-spray immediately.

3.05 TURF MAINTENANCE

A. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.

2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Turf Post fertilization: Apply fertilizer after initial mowing and when grass is dry as recommended by soil laboratory.

3.06 SATISFACTORY TURF

A. At end of initial establishment period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 95 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.07 REMEDIAL WORK

A. The Owner's Representative reserves the right to reject any seeded areas where there is unsatisfactory germination, coverage, color or growth of grass, or unacceptable weed growth.

B. Reseed rejected areas and remove undesirable weeds as necessary until accepted. Reseeding and repair of unacceptable areas shall be performed at the expense of the Contractor and performed at the next earliest opportunity, weather and season permitting.

C. Reestablish seeded areas that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.08 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly seeded areas from foot traffic. Maintain fencing and barricades throughout establishment period.

C. Remove non-degradable erosion control measures after grass establishment period.

END OF SECTION

SECTION 32 93 00 - PLANTS AND PLANTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Supply and installation of plant material, plant anchoring devices metal edge restraint, mulch and other topdressings

B. Fine grading of planting areas.

C. Guarantee & warranty of work specified in this section.

1.02 RELATED SECTIONS

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

B. Section 01 35 70 - Buy America Certification Procedures

C. Section 01 40 00 - Quality Requirements

D. Section 01 60 00 - Product Requirements

E. Section 32 84 00 - Planting Irrigation

F. Section 32 91 13 - Soil Preparation

G. Section 32 97 00 - Plant Warranty & Maintenance

1.03 DEFINITIONS

A. The following publications, referred to thereafter by basic designation only, form a part of this specification to the extent indicated by references:

1. AMERICAN STANDARD FOR NURSERY STOCK, 2004 (ANSI Z60.1-2004), published by American Nursery & Landscape Association (ANLA)

2. STANDARDIZED PLANT NAMES, 1942 Edition, published by J. Horace McFarland Company.

3. Federal Standard for Fertilizers - Mixed, Commercial: FS0-F-241D

B. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

C. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with 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 kind, type, and size of exterior plant required.

D. Finish Grade: Elevation of finished surface of planting area.

E. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become planting soil; mixed with soil amendments..

F. Root Bound: Encircling roots at the bottom and/or sides of the rootball of a container-grown plant that indicate it has been left too long in too small a pot

G. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing amended topsoil.

H. Stockpiled Topsoil. Existing soil from the A Horizon, which is a uppermost soil layer that is, darker, contains decomposed organic matter, nutrients and soil life. It is capable of growing plants

I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

J. Warranty Period: One year from date of Substantial Completion.

1.04 SUBMITTALS

A. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

B. Submittals shall be made in accordance with Division 1, Section "Administrative Requirements".

C. Product Data: Submit material showing manufacturer's name, catalog numbers, catalog cuts, technical data, and manufacturer's installation instructions.

D. Certified Confirmed Orders: Certify in writing within 30 days of the award of the bid, confirmed orders for plants and provide the quantity, location, phone number and address of the grower who has agreed to provide plant material.

1. Provide trees grown on their original root stock whenever practicable. Submit confirmation for all trees. Trees not grown on their original root stock require written approval from Owner prior to procurement.

E. Work Schedule indicating dates, areas, and types of work to be performed, updated weekly.

F. Certificates: Submit Certificates required by law with shipments. Upon completion of the installation, deliver certificates to the Owner's Representative.

G. Qualification Data: For Landscape Installer.

H. Plant Schedule:

1. Provide comprehensive schedule of all plants to include all accepted plant substitutions. Provide botanical name, common name, plant size, quantity and supplier for all plants.

2. Submit schedule indicating anticipated planting dates that reflects appropriate timing for plant varieties.

I. Mulch Samples: Submit three 1-quart size samples.

J. Weed/Pest Control Plan: Reference Section 32 97 00 – Landscape Warranty and Maintenance.

1.05 APPROVALS

A. "Approval" does not release Contractor from responsibility for providing materials or methodologies according to specifications.

B. Plant Material:

1. Make all plant material available for observation by the Owner's Representative. Notify the Owner's Representative of the place and time of observation 7 days prior to the proposed observation.

2. Plant material as indicated on the Drawings may be inspected by the Owner's Representative at the nursery prior to delivery. During the inspection the Owner's Representative will tag a representative percentage as determined by Owner's Representative, of tree and tall shrub materials that are chosen for use on the project. Tags shall not be removed until requested by the Owner's Representative.

All other plants shall match the size and quality standard of the tagged representative.

3. Acceptance of plant material at the nursery does not preclude rejection of plant material on the site prior to, or after planting. The Contractor shall be responsible for any costs associated with the removal and subsequent replacement of rejected plant material.

C. Subgrade Preparation: Obtain approval of subgrade preparation before placing Growing Medium.

D. Growing Medium: Obtain approval of the Growing Medium and fine grading prior to installation of all plants.

E. Layout: Receive approval of the layout of plant material prior to planting.

F. Inspections:

1. Plant material: Upon delivery to the project site.

2. Planting area subgrade and tree anchoring

3. Planting area layout

4. Tree and shrub layout

1.06 PLANT MATERIALS SUBSTITUTION

A. Plants, not specifically named in the plant list, will not be accepted unless specifically accepted in writing by the Landscape Architect.

B. Substitutes proposed for approval, in each case shall possess the same essential characteristics as the kind of plant specified in regard to appearance, ultimate height, shape, and habit of growth, general soil, and other requirements.

1.07 QUALITY ASSURANCE

A. Government Inspection: Meet or exceed the specifications of federal, state and county laws requiring inspection of plants and planting material for plant disease and control.

B. Industry Standards: Quality definitions, grading tolerances, and caliper to height ratios shall be no less than minimums specified in American Standards for Nursery Stock, published by American Association of Nurserymen, Inc., ANSI Z60.1-1990.

C. Owner’s Representative's Inspection: Owner’s Representative may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Owner’s Representative retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site. Contractor shall locate acceptable plant material and place new orders to replace rejected plant material at no additional cost to the Owner.

1. Notify Owner’s Representative of sources of planting materials 14 days in advance of delivery to site.

D. The landscape work shall be performed by a single firm specializing in landscape and irrigation work. Landscape and landscape irrigation shall be performed by the same firm. The firm shall have a current license as a landscape contractor from the state of Oregon with at least 10 years’ experience with projects similar in material, design, and extent to that indicated for this Project and with a record of successful establishment.

1. Installer's Field Supervision: Maintain an experienced full-time supervisor on Project site when planting is in progress.

E. Verify plant counts and planting area square footages prior to submitting bids. If plant courts vary from what is shown on Drawings, quantity shown graphically on Drawings shall govern. Notify Owner's Representative of any discrepancies.

F. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."

1. Selection of plants purchased under allowances will be made by Owner's Representative, who will tag plants at their place of growth before they are prepared for transplanting.

G. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

H. Comparable Products: Product that is demonstrated and approved through the submittal process, or where indicated as a product substitution, to have qualities that equal or exceed those of specified product.

1.08 SCHEDULE, TRANSPORT AND DELIVERY

A. Do not install plants until the automatic irrigation system installation is completed, tested, and the system is fully operational.

B. Deliver plants freshly dug.

C. Container and Field Grown Plants:

1. Transport of container grown, B&B & wire basket plants shall be restricted to closed van or truck, to protect the leaves or needles from windburn.

2. Do not subject plants to temperatures below 25 degrees for a period longer than 4 hours.

3. Do not prune trees and shrubs before delivery, except as approved by Owner's Representative.

4. Protect bark, branches, and root systems from physical damage, sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape.

D. 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 cool moist environment, protect from weather and mechanical damage, and keep roots moist.

1. Bare Root or bulb stock: Roots and/or bulbs should be covered and protected immediately from frost, sun and wind.

2. Ball & Burlap/Wire Basket: Handle with caution to maintain the firmness of the rootball. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.

3. Pots/Containers: Do not remove container-grown stock from containers before time of planting. In extreme weather, freezing or high dry heat, bury containers in a protective medium (Examples: sawdust, peat moss, topsoil). Do not keep plants requiring full sun in the shade for a period exceeding 4 days during the growing season.

4. Water plants on-site to maintain moist root systems.

5. Deliver trees over 4 inches in caliper and/or 12 feet tall with extreme care.

E. Store fertilizers in a dry place and protect from intrusion of moisture.

F. Handling: Do not drop plants. Do not pick up container plants by stems or trunks. Handle planting stock by root ball.

G. Miscellaneous materials: Protect materials during construction and storage on site from contamination or damage.

H. Store plants in an upright position and in the same solar and moisture environment it will receive once installed.

1.09 COORDINATION

A. Coordinate with other trades so the plants are installed in the appropriate season.

B. Weather Limitations: Install plans only when existing and forecasted weather conditions permit.

1.10 SUBSTITUTIONS

A. Plants, not specifically named in the plant list, will not be accepted unless specifically accepted in writing by the Landscape Architect.

B. Substitutes proposed for approval, in each case shall possess the same essential characteristics as the kind of plant actually specified in regard to appearance, ultimate height, shape, and habit of growth, general soil, and other requirements.

C. Submit substitution requests prior to bid date in accordance with Division 1, Section “Product Requirements”.

D. Submit evidence that the specified material is unavailable before requesting substitutions.

E. Where evidence is submitted that a specified plant is unavailable, substitutions in kind, size and grade will be made only upon written approval by the Landscape Architect.

F. Search for plants throughout the U.S.A. and Canada, as allowed by local and federal regulations.

1.11 PROJECT CONDITIONS

A. 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.

B. Coordination with Lawn and Turf Areas: Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated. See Section 32 9200 – Turf and Grasses.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas and promptly repair damage caused by planting operations.

1.12 CONDITIONS FOR ACCEPTANCE

A. The Owner’s Rep may accept work when all of the following conditions exist per the Contract Documents:

1. Planting soil quality, fertility levels, depths and surface grading

2. Plants are in correct size, health and locations.

3. Plants are healthy and growing.

4. Trees plumb and correctly anchored.
5. Pruning is completed
6. Planting areas are free of weeds.
7. Mulch is in place at correct depths.
8. Edge restraints are correctly installed.
9. Root barrier correctly installed.
10. Unmulched areas are cultivated to leave a loose, friable, water-permeable surface.
11. Provide maintenance calendar. See Section 32 97 00 - Plant Warranty & Maintenance

PART 2 - PRODUCTS

2.01 PLANT REQUIREMENTS

A. Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning.

B. Plant Names: Furnish plants true to name and with waterproof tag securely attached to one plant in fifty with the common and botanical names. Name and size of plants shall be in accordance with the standards of practice of the American Association of Nurserymen and shall conform to "Standardized Plant Names." 1942 Edition, published by J. Horace McFarland Company. In all cases, botanical names take precedence over common names.

C. Native Species: Only true native species are acceptable, e.g., no varieties.

D. Plants shall be compact and properly proportioned, not weak or thin, or injured by being planted too closely at the nursery. Plants shall have normal, well-developed branches and vigorous, fibrous root systems. They shall be healthy, vigorous plants, free from defects, decay, disfiguring roots, sunscald injuries, and abrasions of the bark, plant diseases, insect pests and all forms of infestation or objectionable disfigurements.

E. If formal plant arrangements or consecutive order of trees or shrubs is shown, select stock for uniform height and spread, and number label to assure symmetry in planting.

F. Container-Grown Plants:

1. All plants specified "Container" shall be grown for the length of time necessary to permit the roots to fill and hold the soil within the container, but not root-bound.
2. Groundcover plants shall have healthy tops to a size proportionate to the above root requirements typical of the species or variety.

G. Field-Grown Plants:

1. Coniferous trees shall be grown and spaced in a manner that promotes the natural growth habit of the specified plant. Trees shall not be sheared. Coniferous trees shall have a single central leader. Trees with evidence of a broken, cut or damaged central leader will not be accepted.
2. Trees shall have straight trunks unless that would be uncharacteristic of the species and shall be well branched.
3. Root balls shall be solid, tied tightly with burlap and of a sufficient size and depth to encompass the fibrous and feeder root system.

a. Securing Root Balls over 24 inches: Secured with either daisy baskets or wire baskets and tied with either double twine or poly rope.

b. Securing Root Balls under 24 inches: Secured with either poly twine or treated sisal with a maximum of 4 inches between wraps.

H. Bulbs: Bulbs shall be held and maintained in a nursery until suitable time for planting. Bulbs shall be the finest grade quality available and shall be kept in a cool, dry place suitable for storing bulb stock.

2.02 SHADE AND FLOWERING TREES

A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.

1. Provide balled and burlapped, field-dug trees.

2. Branching Height: minimum one-half of tree height.

3. All street trees to be limbed up the required 7'- 0" from finished grade.

4. Provide trees grown on their original root stock whenever practicable. Submit confirmation for all trees. Trees not grown on their original root stock require written approval from Owner prior to procurement.

B. Small Upright and Spreading Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:

1. Stem Form: as indicated on the Plant Schedule.

2. Provide balled and burlapped, field-dug trees.

3. Provide trees grown on their original root stock whenever practicable. Submit confirmation for all trees. Trees not grown on their original root stock require written approval from Owner prior to procurement.

2.03 DECIDUOUS SHRUBS

A. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

1. Provide balled and burlapped, container-grown shrubs.

2. Provide trees grown on their original root stock whenever practicable. Submit confirmation for all trees. Trees not grown on their original root stock require written approval from Owner prior to procurement.

2.04 GROUND COVER PLANTS

A. Ground Cover: Provide ground cover of species indicated, established and well rooted in pots or similar containers, and complying with ANSI Z60.1.

2.05 MISCELLANEOUS MATERIALS

A. Wood Mulch

1. Standards: Mulch shall meet the highest standards set by the Mulch & Soil Council.

2. Free from noxious weeds, weed seed and foreign material harmful to plant life.

3. Product: medium grind shredded hemlock, maximum size to pass a 3/4" mesh screen.

4. Depth: 2 inches

B. Tree Anchors and Ties:

1. Wood Tree Stakes: Round, Douglas fir, 2-inch diameter, 8 feet nominal length.

2. Tree Ties: 1-inch width heavy duty plastic chain-lock tree ties as manufactured by Gardman or equal. No hose chafing guard and wire allowed.

C. Root Control Barrier:

1. Basis of Design: DeepRoot UB 18-2 or approved equal. Install per Manufacturer's recommendations.

D. Fertilizers, Amendemtents and Mycorrhizal Innoculate: reference Section 32 91 13 – Soil Preparation

E. Metal Edge Restraint:

1. Manufacturer: PermaLoc or approved equal

2. Product: CleanLine Edging

3. Size: 1/8" x 5.5"

4. Color: Black Anodized

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

B. Provide 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. Coordinate location and installation of all piping and appendages at planters with respective trades prior to soil mix backfill.

3.03 PLANT LAYOUT

A. Install upright and face to give best appearance or relationship to adjacent plants and structures.

B. Stake perimeter of planting areas and tree locations. Adjust locations when requested, and obtain Owner's Representative's acceptance of layout before planting. Make minor adjustments as required.

C. Tree locations over structure are precise and any deviation from plan requires advance approval from Landscape Architect and Structural Engineer.

D. Request the direction of the Owner's Representative regarding the preferred grouping, layout and orientation of plants.

E. The Contractor shall receive approval of the layout from the Owner's Representative prior to planting. Any plants installed prior to being approved shall be relocated by the contractor at no additional cost.

3.04 TREE AND SHRUB EXCAVATION

A. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped, container-grown stock.

2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.

B. Subsoil removed from excavations may be used as backfill amended as per requirements of soil report for planting soil.

C. Obstructions: Notify Owner's Representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

D. Drainage: Notify Owner's Representative if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

E. Fill plant pits with water and allow it to drain away before placing trees and shrubs.

3.05 ROOT-CONTROL BARRIER

A. Root control barrier shall be installed in trenches per Manufacturer's recommendations, alongside hardscape structures such as sidewalks, curbs, pavement, walls, foundations, and concrete occurring within 15 feet of new trees (measured from trunk).

3.06 PREPARING ROOTS

A. Water plants before removing from container.

B. Balled and Burlaped Trees: Carefully remove top 1 to 1 ½" of soil from the rootball to remove any weed contaminated soil or excess soil piled onto the rootball during burlapping process. Extreme care is to be taken not to disturb the shallow feeder roots of the rootball.

C. Container grown plants are to be inspected by the Contractor for the presence of a tightly bound root mass. Such plants are to have the root mass loosened to promote root growth.

3.07 INSTALLATION OF PLANTS AND SOIL

A. Plants shall be installed so that after settlement they will be at the original growing medium depth. Total depth of rootball shall be planted in growing medium.

B. Set plant plumb in the planting beds or in the center of the planting pit, except where the plants' character requires otherwise.

C. Growing medium shall be placed in lightly compacted layers around the rootball. Each layer shall be carefully tamped to avoid injuring the rootball, or disturbing the position of the plant. When hole is 4 inches deep, fill with water and let stand until water is absorbed by soil. Fill to finish grade and provide 2 inches depressed water basin at each shrub and tree.

D. When growing medium is up to two-thirds of the rootball height, ties shall be cut and the top portion of "burlap" on B&B plants shall be folded back unless specified otherwise. The backfilling shall be completed and tamped lightly.

E. Wire baskets shall not be removed. The wire basket shall remain intact. Any visible portion should be folded down away from the top of the root ball except when tree is larger than 5-inch caliper.

F. All imperishable containers and tying materials shall be removed. Perishable containers such as fiber tubs should also be removed.

G. Water plants within 6 hours of time of installation. Initial watering-in of trees and shrubs by underground sprinkler system is not permitted.

3.08 TREE SUPPORT

A. Brace trees immediately following installation. Brace trees plumb in all directions per Drawings.

3.09 FIELD PRUNING

A. Only prune dead or injured branches. Do not prune to compensate for the loss of roots as a result of transplanting operations. Pruning to preserve the natural character of the plant, unless directed otherwise. Use clean, sharp tools. Cut cleanly and near the branch collar, leaving no stubs. Cuts, bruises or scars on the bark shall be traced back to living tissue and removed. The affected areas shall be shaped so as not to retain water.

B. Additional pruning, thinning, and shaping of trees and shrubs may be required as directed by Owner's Representative to provide a healthy looking symmetrical plant.

3.10 MULCHING

A. Apply mulch within two days of installing plant material. Provide 3-inch depth of organic compost mulch at all on grade planters within public right-of-way. Saturate mulch layer and topdress as necessary to achieve full depth after settlement.

B. Lift plant foliage above mulch.

C. Prevent mulch from touching the root crown of plants.

3.11 CLEANUP AND PROTECTION

A. Keep the entire work area clean, safe and an orderly.

B. Protect plants from damage by other contractors, visitors and from vandalism. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plants and other materials.

3.12 DISPOSAL

A. Remove surplus material, including excess subsoil, unsuitable soil, trash, debris etc. and legally dispose of them off Owner's property.

3.13 ESTABLISHMENT MAINTENANCE

A. Reference Section 32 97 00 – Landscape Warranty and Maintenance.

END OF SECTION

SECTION 32 97 00 - LANDSCAPE WARRANTY AND MAINTENANCE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. All plants, lawns soil and irrigation system to warranted and maintained for 730 calendar days commencing at the date of approved Substantial Completion to ensure plant establishment.

1.02 RELATED SECTIONS

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

B. Section 01 40 00 - Quality Requirements

C. Section 01 60 00 - Product Requirements

D. Section 32 84 00 - Planting Irrigation

E. Section 32 91 13 - Soil Preparation

F. Section 32 92 00 - Seeding

G. Section 32 93 00 - Plants and Planting

1.03 OWNER'S RESPONSIBILITY

A. Water: Owner will pay for water used for irrigation after the date of Substantial Completion.

B. Power: Owner will pay for power used by irrigation controllers after the date of Substantial Completion.

1.04 SUBMITTALS

A. Maintenance Instructions: Provide maintenance calendar with tasks and frequency for the duration of the warranty and maintenance period. Submit before substantial completion.

1.05 WARRANTY AND MAINTENANCE REQUIREMENTS

A. All materials herein are to be maintained and warranted for 730 calendar days commencing at the date of approved Substantial Completion to ensure establishment.

B. All plant materials and equipment replaced under warranty shall be replaced accordance with all provisions of the Contract Documents. Equipment shall be of the same manufacturer, model, size and quantity as originally installed. Owner reserves the right to inspect plant materials replaced under warranty and reject those that do not conform to specified standards.

C. Operations and maintenance of stormwater planter facilities shall be in accordance with all local and regional codes.

D. Criteria for maintenance period acceptance includes:

1. Weed free lawns and planting areas
2. No soil erosion in lawns and planting areas
3. Lawns fully established, mowed & edged
4. Vigorous plant material. Free of insects, mold, disease etc. Fully leafed.
5. Trees plumb in all directions.
6. No soil erosion

7. Correct soil depths.
8. Correct mulch type and depths
9. Not litter
10. No leafs on paving areas or lawns
11. Fully operational irrigation system. Adjusted and scheduled and winterized.

1.06 WEED/PEST CONTROL PLAN

A. Contractor shall submit a Weed/Pest Control Plan for approval at least 30 days prior to Final Acceptance of the work. The Weed/Pest Control Plan shall define all methods for weed and pest control.

B. The Contractor shall submit for pre-approval all methods and products to be used for weed and pest control. No herbicides/pesticides shall be applied without prior written approval from Owner. If unanticipated weed growth or infestations occur, the Contractor shall be required to modify Weed/Pest Control Plan and secure Owner's Representative written approval prior to application.

C. Where approved, all applications of herbicides/pesticides shall be performed by an Oregon State licensed commercial applicator. All precautions shall be taken in the handling and applications of all herbicides/pesticides as stated on the product label and in the 1990 Oregon Weed Control Handbook. No contamination of vicinity water systems or storm drain systems allowed. No cleaning of equipment or disposal of products allowed in project vicinity.

1.07 PLANT WARRANTY

A. Warranty trees, shrubs, ground covers for one calendar year past the date of Substantial Completion for all causes and problems. All plants within the public right-of-way that are a part of this project are included with this warranty and maintenance requirement.

B. Plant replacement shall be made with plants that comply with the specified plant material on the Drawings. Replacements shall be made immediately upon deterioration of plant in decline or dead and made prior to the expiration of the warranty period which is of the same size as surrounding, like material.

C. Plant materials, which are replaced under warranty, shall have an extended warranty period of one year from the time of replanting.

1.08 LANDSCAPE PRODUCTS WARRANTY

A. Warranty all landscape products against all defects of materials and workmanship. including, but not limited to trees, shrubs, ground covers, bulbs, perennials, lawn, soils, compost, mulch, root barriers, edge restrains, stone, river rock and tree staking accessories

1.09 IRRIGATION WARRANTY

A. Warranty the work of the entire irrigation system against all defects of materials and workmanship.

PART 2 - EXECUTION

2.01 PLANT REPLACMENT

A. Replace plants that are more than 25% dead or dying or diseased.

B. Replace plants that have reached their wilting point (lack of water).

C. Replace plants damaged by vehicles, vandalized or stolen.

D. Replace plants with the same variety, size, and quality as originally specified, unless otherwise approved.

E. Replacement plants will be subject to these specifications. Plant materials, which are replaced under warranty, shall have an extended warranty period of one year from the time of replanting.

2.02 SOILS

A. Protect paved and seating areas when working. No soil, debris or plant material is allowed to be set directly pavement system without tarps or protection boards below landscape materials.

B. Maintain soil in lawn and planting areas in a manner that promotes the growth of the specified plants. Provide soil sampling and analysis to fix or improve soils. Amend or replace soils to remedy poor soils.

C. Take extreme care to use only the specified soil for each of the different landscape planting areas.

D. Where soil has settled 1-inch or more it is to be replenished with approved soil. Do not exceed soil depths as prescribed on the Drawings.

E. If replenishing soil is necessary, first remove mulch. Place new mulch at depths per Drawings.

F. Frequently monitor landscape areas for the possibility and/or presence of surface erosion and for the detection, recognition and timely control of erosion before it happens.

G. The control and repair of surface erosion shall include, but not be limited to re-grading of eroded areas and reinforcement with appropriate erosion control mulch. Replace eroded areas, washouts or bare areas within the period of the contract at no additional cost.

H. Frequently monitor all areas for weeds to avoid out of control weed blooms. Remove weeds from landscape areas, rock edging and sidewalk areas etc., according to approved Pest Control Plan until final acceptance. Chemical practices shall not be allowed without prior written approval from Owner.

I. Stormwater areas and landscape areas shall be gently raked through to remove debris and promote an attractive fresh appearance. Care is to be taken not to disturb planter liners, subgrade materials or waterproofing where applicable.

J. Rodent Control: The contractor shall take the necessary action to prevent damage to the planted areas by rodents and moles. The contractor will repair damage caused by rodents.

K. Leaf Removal: Removal of all leaves from walkways as needed to maintain a clean appearance. Main entries, high traffic areas, and walkways shall be kept cleared of leaf debris accumulation.

2.03 INTEGRATED PEST MANAGEMENT

A. Follow Owner’s Integrated Pest Management Program.

B. If an unknown plant problem occurs or an insect cannot be identified contact your local Master Gardener hotline or plant clinic, for identification and future management options.

2.04 HERBICIDE AND PESTICIDE APPLICATION

A. Do not apply herbicides or pesticides without written approval by Owner. Request for use of herbicides shall be in writing and shall indicate: herbicide proposed to be used; location, rate, and time of proposed application; method and extent of application; type of equipment to be used; and qualifications of the applicator.

1. An Oregon State licensed commercial applicator must apply herbicides and pesticide.
2. All precautions shall be taken in the handling and applications of all herbicides and pesticides as stated on the product label.
3. No contamination of vicinity water systems or storm drain systems allowed. No cleaning of equipment or disposal of products allowed in project vicinity.
4. Use only herbicides and pesticides approved for aquatic use by the National Marine Fisheries Service.

2.05 WEED CONTROL

A. Control weeds before they seed.

B. Monitor for weeds frequently, particularly during the spring and summer months to make removal by non-chemical means easier.

C. Noxious Weeds

D. Remove all Noxious Weeds as defined by the State of Oregon as soon as they are detected.

E. Non-noxious Weeds

F. Manage non-noxious weeds to less than 5% of the planting area or lawn area.

G. Remove entire weed before it flowers and dispose off-site.

H. Control weeds while they are small. Control weeds by:

1. Hand pulling.
2. Mechanical removal, e.g., hoeing and spades.
3. Applying mulch to originally specified depth.
4. Limiting overhead spray irrigation.
5. Infrequent deep irrigation.
6. Limiting fertilizer. Base fertilizer application on soil testing.
7. Encouraging 100% plant coverage over the planting area.

2.06 MULCHING

A. Maintain mulch at depths as specified.

B. Rake much smooth and even with finish grade. Do not mound mulch at trees and shrubs.

C. Pull mulch back from stems 1 inch.

D. Where groundcover is filling in add mulch to cover spaces between branches.

2.07 TREE ALIGNMENT

A. Maintain plumb tree alignment. Adjust ties to avoid injury to the cambium layer. Remove stakes and guy wires at the end of the maintenance period only if the tree is well rooted into the bed and vertically stable.

2.08 LAWN MOWING

A. Mow lawns with professional quality mower equipment.

B. Maintain lawn at a 3-inch height. The grass shall be cut at a uniform height. Scalping and uneven cutting shall be prevented.

C. Leave lawn clipping equally distributed across the lawn—do not bag clippings.

D. Bag and remove clippings only when excessive leaf debris is present, turf is too long to mulch, or when moisture conditions are too high to allow effective mulching without substantial clumping of turf debris.

E. Clippings will be swept or blown from hardscapes after each mowing. Sweeping is preferable.

F. Repair lawn with the originally specified seed mix.

2.09 TRIMMING AND EDGING LAWN

A. Trim around all signs, guard posts, trees, shrubs, light poles, and other obstacles.

B. Trim lawn to mowing height.

C. Mechanically edge perimeter of lawns.

D. Do not spray out lawn grasses along edges, guy lines or under trees.

2.10 BULBS

A. Identify and allow foliage of spring-flowering bulbs to brown and die down. Do not mow or dig up.

2.11 FERTILIZING

A. Do not fertilize unless approved in writing by the Owner.

B. If plants show signs of nutrient deficiency, provide soil samples to a soil testing lab for recommendations.

2.12 PRUNING

A. Plantings are designed to grow together and to the edges of the beds to minimize weeds and maximize water conservation.

B. Only Prune to:

1. Remove dead, damaged, and diseased portions of the plant.
2. Remove growth onto walks and curbs.
3. Maintain safety and security. Prune for safety as directed by Owner.

C. If pruning is required, it is preferred to prune following flowering or during plant's dormant season or at an otherwise approved time.

D. Perform emergency pruning as needed. Provide remedial attention and repair to shrubs and trees as appropriated by season or in response to incidental damage.

E. Do not prune or shear plants for shape.

F. During installation, do not prune to reduce the canopy of the plant in relation to its root mass.

G. Do not remove collar at the branch base when pruning.

H. Do not prune trees. If trees require pruning notify Owner. A certified arborist must prune trees. Prune trees as required to remove weak branching patterns and maintain balance of head growth development. Remove lower limbs when there is obstruction of pedestrian clearances.

2.13 LEAF REMOVAL

A. Do not remove leaves from planting areas, except to uncover shrubs from tree leaves.

B. Remove leaves from lawns, walkways, and parking areas.

C. In Fall, place up to 2-inch depth of clean leaves in planting areas as mulch.

D. Remove and dispose of remaining leaves.

2.14 EROSION CONTROL

A. Frequently monitor landscape areas for signs of surface erosion.

B. Control and repair per Oregon DEQ Best Management Practices at no additional cost.

C. For minor repairs, re-grade the eroded slopes and apply the specified mulch to originally specified depths.

2.15 LITTER CONTROL

A. Remove debris and trash to promote an attractive fresh appearance.

2.16 IRRIGATION

A. Perform spring start-up at a date approved by Owner. Test and adjustment and review/revise scheduling.

B. Walk the site testing each zone and head function, throttle, over-spray etc. Replace any broken part or materials immediately.

C. Adjust sunken head heights and adjust head angle.

1. Provide memo to Owner regarding any problems, leaks, adjustments, and scheduling. Recommend a better installation practice or material for broken irrigation components.

D. Perform winterization shutdown at date approved by Owner.

2.17 CLEAN UP

A. All debris and litter resulting from performance of any of the following tasks shall be removed from the property, and disposed of in accordance with local, state, and Federal regulations.

B. At the conclusion of each visit, blow or sweep walks and driveways clear.

2.18 REGULAR INSPECTIONS

A. During the maintenance period, request and make three inspections jointly with the Owner at the following times:

1. Spring, early May
2. Summer, mid-July
3. Fall, late September

B. Depending on when the establishment period begins, one of the above inspections will be the final inspection.

C. During each inspection, the Owner may determine, based upon the specified success criteria, that corrective work is required. If so, the Owner will provide the Contractor with a written notice of required corrective work sent by hand-delivery or mail.

2.19 CORRECTIVE WORK

A. Complete all corrective work within 15 calendar days after receiving the written notice of the required corrective work to be taken. The 15-day requirement excludes those days the Owner determines to be impractical for working.

B. Provide plant replacements of the same variety, size, and quality as specified for the original plants, unless otherwise approved.

C. Notify the Owner when the corrective work is complete. When the corrective work has been re-inspected and is completed to the satisfaction of the Owner, the appropriate payment due the Contractor will be made.

D. If the Contractor does not perform the corrective work within the 15 day period after written notification, excluding those days the Owner determines to be impractical for working, the Owner may have the corrective work done by others and deduct the entire cost of the corrective work from monies due or to become due the Contractor under the Contract.

END OF SECTION

SECTION 33 01 10.58
DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 14 16.

1.02 RELATED REQUIREMENTS

A. Section 33 14 16 - Site Water Utility Distribution Piping.

1.03 REFERENCE STANDARDS

A. AWWA C651 - Disinfecting Water Mains 2014, with Addendum (2020).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Certificate: From authority having jurisdiction indicating approval of water system.

PART 3 EXECUTION

2.01 EXAMINATION

A. Verify that piping system has been cleaned, inspected .

B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

2.02 DISINFECTION

A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.

B. Provide and attach equipment required to perform the work.

C. Inject treatment disinfectant into piping system.

D. Maintain disinfectant in system for 24 hours.

E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.

F. Replace permanent system devices removed for disinfection.

END OF SECTION 33 01 10.58

SECTION 33 05 61
CONCRETE MANHOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Precast concrete manholes.

B. Grade adjustments.

C. Frames and covers.

1.02 RELATED REQUIREMENTS

A. City of St. Helens Special Provision 05110: Refer to City spec for storm sewer manhole requirements.

B. Section 01 35 70 - Buy America Certification Procedures

C. Section 03 30 00 - Cast-in-Place Concrete.

D. Section 31 23 16 - Excavation.

E. Section 31 23 23 - Fill.

F. Section 33 42 11 - Stormwater Gravity Piping.

1.03 SUMMARY

A. Comply with Contract Build America, Buy America Provisions.

1.04 STANDARD AND REGULATORY REQUIREMENTS

A. "Build America, Buy America" Requirement: All manufactured products listed within this specification section are part of a federally assisted procurement involving funds granted by the Department of the Interior (DOI) and shall comply with Build America, Buy America Act requirements as delineated in Section 1. Items listed in these specifications which fall under the Act have been researched to indicate preliminary compliance with the basis of design functional requirements. Bidders are expected to confirm compliance with all materials and/or products which require compliance with the "Build America, Buy America". The Contractor is required to obtain a Certificate of Materials Origin for all products subject to the "Build America, Buy America".

1.05 REFERENCE STANDARDS

A. AASHTO HB - Standard Specifications for Highway Bridges 2005, with Errata.

B. ASTM A48/A48M - Standard Specification for Gray Iron Castings 2022.

C. ASTM C478/C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections 2020.

D. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants 2009 (Reapproved 2019).

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Installation of concrete manholes with piping and other structures.

1. See Section 33 42 11 for stormwater gravity piping.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

C. Product Data: Provide manhole covers, component construction, Contech Stormfilter , features, configuration, and dimensions.

D. Shop Drawings: Indicate manhole locations, elevations, piping sizes and elevations of penetrations.

E. Manufacturer's Installation Instructions: Indicate special procedures for assembly.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Certification: Certificates or certified test results submitted by the Contractor which demonstrate proof of compliance with the Specifications for products, materials, equipment, systems, and

qualifications of personnel, manufacturers, fabricators, and installers including Certificate of Material Origin for materials subject to Build America, Buy America requirements. "Build America, Buy America" Certificates: "Build America, Buy America" certificates required during bidding shall also be required as part of each product submittal. Certificates shall be complete and accurate. Certificates shall indicate either compliance or non-compliance with the "Build America, Buy America" regulations. Certificates of non-compliance shall also include copies of any granted waivers.

PART 2 PRODUCTS

2.01 CONCRETE MANHOLES

A. Weight Rating: H 10 according to AASHTO HB.

B. Precast Concrete Manholes: Comply with ASTM C478/C478M, reinforced.
   1. Wall Thickness: 6 inches (152 mm).
   2. Base Thickness: 12 inches (305 mm).
   3. Reinforcement: Formed steel wire, galvanized finish, wire diameter as indicated on drawings.
   4. Joint Sealant: Comply with ASTM C990.

C. Contech Stormfilter Manhole:
   1. Stormfilter manhole as shown on plans.
   2. 2 Cartridge Manhole as manufactured by Contech

D. Grade Adjustments:
   1. Adjustment Ring: Expanded polypropylene, 6 inches (152 mm) wide, diameter matching frame dimensions, in accordance with ASTM C478/C478M.

E. Frame and Cover: Cast iron construction, ASTM A48/A48M Class 30B, machined flat bearing surface; hinged; sealing gasket.

2.02 ACCESSORIES

A. Steps: Formed galvanized steel rungs; 3/4 inch (19 mm) diameter. Formed integral with manhole sections.

2.03 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.

2.04 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

3.01 EXAMINATION

A. Verify items provided by other sections of work are properly sized and located.

B. Verify that built-in items are in proper location, and ready for roughing into Work.

C. Verify excavation for manholes is correct.

3.02 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

3.03 EXCAVATION AND FILL

A. Hand trim excavation for accurate placement to indicated elevations.

B. Backfill with cover fill, tamp in place and compact, then complete backfilling.

3.04 INSTALLATION

A. Establish elevations and pipe inverts for inlets and outlets as indicated in drawings.

B. Precast Concrete Manholes:

1. Place base section plumb and level.
2. Install joint sealant uniformly around section lip.

C. Grade Adjustments:
1. Install expanded polypropylene ring according to manufacturer's instructions.
2. Place adjacent materials tight, and smooth following design grades.

D. Frames and Covers:
1. Place frame plumb and level.
2. Mount frame on expanded polypropylene ring according to manufacturer's instructions.
3. Place grate in frame securely.

END OF SECTION 33 05 61

SECTION 33 14 16
SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water pipe for site conveyance lines.

1.02 RELATED REQUIREMENTS

A. City of St. Helens Special Provision 04100: Refer to City spec for potable water piping requirements.

B. City of St. Helens Special Provision 04120: Refer to City spec for potable water fittings & appurtenances requirements.

C. City of St. Helens Special Provision 04130: Refer to City spec for demolition and disposal requirements

D. Section 01 35 70 – Buy America Certification Procedures

E. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

F. Section 33 01 10.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.

1.03 SUMMARY

A. Comply with Contract Build America, Buy America Provisions.

1.04 STANDARD AND REGULATORY REQUIREMENTS

A. "Build America, Buy America" Requirements: All manufactured products listed within this specification section are part of a federally assisted procurement involving funds granted by the Department of the Interior (DOI) and shall comply with Build America, Buy America Act requirements as delineated in Section 1. Items listed in these specifications which fall under the Act have been researched to indicate preliminary compliance with the Basis of Design functional requirements. Bidders are expected to confirm compliance with all materials and/or products which require compliance with the "Build America, Buy America". The Contractor is required to obtain a Certificate of Materials Origin for all products subject to the "Build America, Buy America".

1.05 REFERENCE STANDARDS

A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2021a.

B. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40 2021.

C. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80 2020.

D. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets 2020.

E. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems 2018.

F. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2017.

G. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances 2017.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

C. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Certification: Certificates or certified test results submitted by the Contractor which demonstrate proof of compliance with the Specifications for products, materials, equipment, systems, and qualifications of personnel, manufacturers, fabricators, and installers including Certificate of

Materials Origin for materials subject to Build America, Buy America requirements. “Build America, Buy America” Certificates: “Build America, Buy America” certificates required during bidding shall also be required as part of each product submittal. Certificates shall be complete and accurate. Certificates shall indicate either compliance or non-compliance with the “Build America, Buy America” regulations. Certificates of non-compliance shall also include copies of any granted waivers.

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with utility company requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

B. Protect crosslinked polyethylene tubing from direct and indirect UV exposure.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 WATER PIPE

A. Ductile Iron Pipe (for pipes 3 inch and greater): AWWA C151/A21.51:
   1. Fittings: Ductile iron, standard thickness.
   2. Joints: AWWA C111/A21.11, Styrene butadiene rubber (SBR) or vulcanized SBR gasket with rods.
   3. Jackets: AWWA C105/A21.5 polyethylene jacket.

B. PVC Pipe (only for pipes less than 3 inch): ASTM D1785 Schedule 40.
   1. Fittings: ASTM D2466, PVC.
   2. Joints: ASTM D2855, solvent weld.

2.02 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 23 16.13.

B. Cover: As specified in Section 31 23 16.13 and compliant with City of St. Helens detail 300.

2.03 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 a Certificate of Materials Origin for QPL listed products.

2.04 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

3.01 EXAMINATION

A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.02 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.03 TRENCHING

A. See the sections on excavation and fill for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.04 INSTALLATION - PIPE

A. Group piping with other site piping work whenever practical.

B. Establish elevations of buried piping to ensure not less than 3 feet (36 inches) of cover.

C. Install pipe to indicated elevation to within tolerance of 5/8 inches (16 mm).

D. Install ductile iron piping and fittings to AWWA C600.

E. Route pipe in straight line.

F. Install pipe to allow for expansion and contraction without stressing pipe or joints.

G. Slope water pipe and position drains at low points.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Perform field inspection and testing in accordance with Section 01 40 00 and City of St Helens municipal code 18.28.030.

C. Pressure test water piping to meet City of St Helens municipal code 18.28.030

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION 33 14 16

SECTION 33 41 00
SUBDRAINAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. French Drainage Systems.

B. Flow Through Planter Systems.

C. Filter aggregate and fabric and bedding.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 31 23 16 - Excavation: Excavating for subdrainage system piping and surrounding filter aggregate.

C. Section 31 23 16.13 - Trenching: Excavating and backfilling for site subdrainage systems.

D. Section 31 23 23 - Fill: Backfilling over filter aggregate, up to subgrade elevation.

1.03 REFERENCE STANDARDS

A. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2021.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

C. Product Data: Provide data on pipe drainage products, pipe accessories.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Comply with applicable code for materials and installation of the work of this section.

2.02 PIPE MATERIALS

A. Polyvinyl Chloride Pipe: ASTM D2729; plain end, 6 inch (150 mm) inside diameter; with required fittings.

B. Use perforated pipe at subdrainage system; unperforated through sleeved walls.

2.03 AGGREGATE AND BEDDING

A. Filter Aggregate and Bedding Material: Granular fill as specified in Section 31 23 23.

2.04 ACCESSORIES

A. Pipe Couplings: Solid plastic.

B. Filter Fabric: Water pervious type, black polyolefin.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations.

B. Remove large stones or other hard matter that could damage drainage piping or impede consistent backfilling or compaction.

3.03 INSTALLATION

A. Install and join pipe and pipe fittings in accordance with pipe manufacturer's instructions.

B. Place drainage pipe on clean cut subsoil.

C. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).

D. Place pipe with perforations facing up. Mechanically join pipe ends.

E. Install pipe couplings.

F. Wrap perforated pipe with filter fabric.

G. Install filter aggregate at sides, over joint covers and top of pipe. Provide top cover compacted thickness of 12 inches (300 mm).

H. Place filter fabric over levelled top surface of aggregate cover prior to subsequent backfilling operations.

I. Place aggregate in maximum 4 inch (100 mm) lifts, consolidating each lift.

J. Refer to Section 31 23 23 for compaction requirements. Do not displace or damage pipe when compacting.

K. Connect to storm sewer system with unperforated pipe , through installed sleeves.

L. Coordinate the Work with connection to municipal sewer utility service, and trenching.

3.04 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspection and testing.

B. Request inspection prior to and immediately after placing aggregate cover over pipe.

3.05 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation begins.

END OF SECTION 33 41 00

SECTION 33 42 11
STORMWATER GRAVITY PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stormwater drainage piping.

B. Stormwater pipe accessories.

1.02 RELATED REQUIREMENTS

A. City of St. Helens Special Provision 05200: Refer to City spec for storm drainpipe & appurtenances requirements.

B. City of St. Helens Special Provision 05600: Refer to City spec for pipe cleaning & CCTV requirements.

C. City of St. Helens Special Provision 05620: Refer to City spec for pipe and manhole testing requirements.

D. Section 01 35 70 – Buy America Certification Procedures

E. Section 31 23 16 - Excavation: Excavating of trenches.

F. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.

G. Section 31 23 23 - Fill: Bedding and backfilling.

H. Section 33 05 61 - Concrete Manholes.

I. Section 33 42 30 - Stormwater Drains.

J. Section 33 46 00 - Stormwater Management.

1.03 SUMMARY

A. Comply with Contract Build America, Buy America Provisions.

1.04 STANDARDS AND REGULATORY REQUIREMENTS

A. "Build America, Buy America" Requirements: All manufactured products listed within this specification section are part of a federally assisted procurement involving funds granted by the Department of the Interior (DOI) and shall comply with Build America, Buy America Act requirements as delineated in Section 1. Items listed in these specifications which fall under the Act have been researched to indicate preliminary compliance with the Basis of Design functional requirements. Bidders are expected to confirm compliance with all materials and/or products which require compliance with the "Build America, Buy America". The Contractor is required to obtain a Certificate of Materials Origin for all products subject to the "Build America, Buy America".

1.05 REFERENCE STANDARDS

A. AASHTO M 252 - Standard Specification for Corrugated Polyethylene Drainage Pipe 2021.

B. AASHTO M 294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter 2021.

C. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications 2020.

D. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials 2021.

1.06 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the installation of stormwater gravity piping with size, location and installation of stormwater drains according to Section 33 42 30.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.07 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

C. Product Data: Provide data indicating pipe, pipe accessories.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Field Quality Control Submittals: Document results of field quality control testing.

F. Certification: Certificates or certified test results submitted by the Contractor which demonstrate proof of compliance with the Specifications for products, materials, equipment, systems, and qualifications of personnel, manufacturers, fabricators, and installers including Certificate of Materials Origin for materials subject to Build America, Buy America requirements. “Build America, Buy America” Certificates: “Build America, Buy America” certificates required during bidding shall also be required as part of each product submittal. Certificates shall be complete and accurate. Certificates shall indicate either compliance or non-compliance with the “Build America, Buy America” regulations. Certificates of non-compliance shall also include copies of any granted waivers.

PART 2 PRODUCTS

2.01 STORMWATER PIPE MATERIALS

A. Provide products that comply with City of St. Helens Engineering Design Standards.

B. Plastic Pipe: ASTM F-667, D-1245 SDR 26; High Density Polyethylene (HDPE) solid wall pipe; inside nominal diameter of 12 inch (300 mm), with cell classification of 335434C or better, thermal butt fusion joints in accordance with manufacturer's recommendations.

2.02 PIPE ACCESSORIES

A. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

B. Filter Fabric: Non-biodegradable, non-woven .

C. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Stormwater Service" in large letters.

2.03 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 23 16.13 and compliant with City of St. Helens detail 300.

B. Cover: As specified in Section 31 23 16.13.

2.04 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.

2.05 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

3.01 TRENCHING

A. See Section 31 23 16.13 - Trenching for additional requirements.

B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION

A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.

1. Plastic Pipe: Also comply with ASTM D2321.

B. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).

C. Connect to building storm drainage system, foundation drainage system, and utility/municipal system.

D. Install continuous trace wire 6 inches (150 mm) above top of pipe; coordinate with Section 31 23 16.13.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 40 00 - Quality Requirements.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

C. Deflection Test: Test in accordance with City of St Helens municipal code 18.16.280.

3.04 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 33 42 11

SECTION 33 42 30
STORMWATER DRAINS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prefabricated trench drains.

B. Frames and grates.

C. Landscape Area Drain

D. Cleanout

1.02 RELATED REQUIREMENTS

A. City of St. Helens Special Provision 05140: Refer to City spec for catch basins & inlets requirements.

B. Section 01 35 70 – Buy America Certification Procedures

C. Section 31 23 16 - Excavation.

D. Section 31 23 23 - Fill.

E. Section 33 05 61 - Concrete Manholes.

F. Section 33 42 11 - Stormwater Gravity Piping.

G. Section 33 46 00 - Stormwater Management.

1.03 SUMMARY

A. Comply with Contract Build America, Buy America Provisions.

1.04 STANDARD AND REGULATORY REQUIREMENTS

A. "Build America, Buy America" Requirements: All manufactured products listed within this specification section are part of a federally assisted procurement involving funds granted by the Department of the Interior (DOI) and shall comply with Build America, Buy America Act requirements as delineated in Section 1. Items listed in these specifications which fall under the Act have been researched to indicate preliminary compliance with the Basis of Design functional requirements. Bidders are expected to confirm compliance with all materials and/or products which require compliance with the "Build America, Buy America". The Contractor is required to obtain a Certificate of Materials Origin for all products subject to the "Build America, Buy America".

1.05 REFERENCE STANDARDS

A. AASHTO HB - Standard Specifications for Highway Bridges 2005, with Errata.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

C. Product Data: Weight rating for catch basins, drop inlets, trench drains, and frame and grates.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Certification: Certificates or certified test results submitted by the Contractor which demonstrate proof of compliance with the Specifications for products, materials, equipment, systems, and qualifications of personnel, manufacturers, fabricators, and installers including Certificate of Materials Origin for materials subject to Build America, Buy America requirements. “Build America, Buy America” Certificates: “Build America, Buy America” certificates required during bidding shall also be required as part of each product submittal. Certificates shall be complete and accurate. Certificates shall indicate either compliance or non-compliance with the “Build America, Buy America” regulations. Certificates of non-compliance shall also include copies of any granted waivers.

PART 2 PRODUCTS

2.01 LANDSCAPE AREA DRAINS

A. Weight Rating: H 10 according to AASHTO HB.

B. Frames and Grates: Steel, pattern per detail RD375, 24 by 24 inch (____).

2.02 CLEANOUT, LANDSCAPE AREA DRAIN, AND OVERFLOW DRAIN COMPONENTS

A. Lids and Drain Covers: Cast iron, hinged to cast iron frame.
   1. Cleanout:
      a. Lid Design: Checkerboard grill.
   2. Landscape Area Drain:
      a. Lid Design: per RD374.
      b. Nominal Lid and Frame Size: 24 by 24 inch (____) per detail RD374.

2.03 PREFABRICATED TRENCH DRAINS

A. Prefabricated Trench Drain: Polymer concrete.
   1. Weight Rating: H 10 according to AASHTO HB.
   2. Bottom: Sloped.
   3. Frames and Grates: Galvanized steel support, steel grate, linear pattern, match drain opening size.

2.04 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.

2.05 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

3.01 EXAMINATION

A. Verify items provided by other sections of work are properly sized and located.

B. Verify built-in items are in proper location and ready for roughing into work.

C. Verify excavation location and depth are correct.

3.02 EXCAVATION AND FILL

A. Hand trim excavation for accurate placement to indicated elevations.

B. Backfill with cover fill, tamp in place and compact, then complete backfilling.

3.03 INSTALLATION

A. Establish elevations and pipe inverts for inlets and outlets as indicated in drawings.

B. Prefabricated Drop Inlets or Trench Drains:
   1. Place base section plumb and level.
   2. Install according to manufacturer's instructions.

C. Grade Adjustments:
   1. Lay brick or masonry units uniformly on mortar bed with full head joints, running bond. Top with mortar, plumb and level.
   2. Place adjacent materials tight and smooth following design grades.

D. Frames and Grates:
   1. Place frame plumb and level.
   2. Mount frame on prefabricated drop inlets or trench drains according to manufacturer's instructions.
   3. Place grate in frame securely.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Perform field inspection for pipe invert elevations.

C. If inspections indicate work does not meet specified requirements, adjust work and reinspect at no cost to Owner.

END OF SECTION 33 42 30

SECTION 33 46 00
STORMWATER MANAGEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flow Through Planter.

B. Outlet structures for stormwater Flow Through Planters.

C. Vegetated Filter Strip.

1.02 RELATED REQUIREMENTS

A. Section 01 35 70 – Buy America Certification Procedures

B. Section 31 23 16 - Excavation.

C. Section 31 23 16.13 - Trenching.

D. Section 31 23 23 - Fill.

E. Section 33 05 61 - Concrete Manholes.

F. Section 33 42 11 - Stormwater Gravity Piping.

G. Section 33 42 30 - Stormwater Drains.

1.03 REFERENCE STANDARDS

A. AASHTO HB - Standard Specifications for Highway Bridges 2005, with Errata.

B. ASTM A48/A48M - Standard Specification for Gray Iron Castings 2022.

1.04 SUMMARY

A. Comply with Contract Build America, Buy America Provisions.

1.05 STANDARD AND REGULATORY REQUIREMENTS

A. "Build America, Buy America" Requirements: All manufactured products listed within this specification section are part of a federally assisted procurement involving funds granted by the Department of the Interior (DOI) and shall comply with Build America, Buy America Act requirements as delineated in Section 1. Items listed in these specifications which fall under the Act have been researched to indicate preliminary compliance with the Basis of Design functional requirements. Bidders are expected to confirm compliance with all materials and/or products which require compliance with the "Build America, Buy America". The Contractor is required to obtain a Certificate of Materials Origin for all products subject to the "Build America, Buy America".

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Items in this section are required to comply with Buy America Requirements. See Section 01 35 70 – Buy America Certification Procedures for certification requirements.

PART 2 PRODUCTS

2.01 FLOW THROUGH PLANTER

A. Fill: See Section 31 23 23.

B. Stormwater Facility Growing Medium: comply with Clean Water Services Detail 742.

C. 3/4"-1/4" Clean Crushed Drain Rock

D. 1 1/2"-3/4" Clean Crushed Drain Rock

2.02 OUTLET STRUCTURES FOR STORMWATER FLOW THROUGH PLANTERS

A. 18" Minimum Diameter Drain Basin, Nyloplast or approved equal.

B. 18" Minimum Ductile Iron Beehive Style/Dome Grate or approved equal.

C. Comply with Clean Water Services Detail 760.

2.03 VEGETATED FILTER STRIP

A. Vegetated Filter Strip Amended Soil: comply with Clean Water Services Detail 742.

B. 2"-3/4" Clean Crushed Drain Rock

2.04 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.

2.05 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

3.01 EXAMINATION

A. Verification of Conditions:
   1. Verify excavations are at correct topographies and areas to be filled are not compromised with surface or ground water.
   2. Verify items provided by other sections of work are properly sized and located.

3.02 PREPARATION

A. Coordinate placement of inlet and outlet pipe required by other sections.

3.03 FLOW THROUGH PLANTER CONSTRUCTION

A. Fill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen, or spongy subgrade surfaces.

3.04 FLOW THROUGH PLANTER OUTLET CONSTRUCTION

A. Precast Structure: Place structure sections plumb and level, trim to correct elevations.

3.05 VEGETATED FILTER STRIP CONSTRUCTION

A. Fill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen, or spongy subgrade surfaces.

END OF SECTION 33 46 00