PORT OF TACOMA

TACOMA, WASHINGTON

MAINTENANCE BUILDING BACK-UP GENERATOR

PROJECT NO. 101610.01

CONTRACT NO. 072074

Thais Howard, PE

Director, Engineering

Joe Caldwell

Project Manager

END OF SECTION

This page intentionally left blank

The undersigned Engineer of Record hereby certifies that the Technical Specifications for the following portions of this project were written by me, or under my direct supervision, and that I am duly registered under the laws of the State of Washington, and hereby affix my Professional Seal and signature.

Those Sections prepared under my direct supervision and being certified by my seal and signature below are as follows:

SEAL & SIGNATURE	SECTION(S)
	03 30 00, 31 00 00, 31 05 16, 31 10 00, 31 23 33, 31 50 00, 32 12 16.01
	02 41 13, 26 00 00, 26 01 00, 26 05 00, 26 05 19, 26 05 26, 26 05 29, 26 05 33, 26 05 43, 26 05 53, 26 08 00, 26 08 01, 26 24 13, 26 27 16, 26 32 13, 26 36 00

END OF SECTION

This page intentionally left blank

PROCUREMENT AND CONTRACTING REQUIREMENTS

SPECIFICATIONS

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. Contract Drawings: The following drawings are a part of the Contract Documents:

Sheet No.	Drawing Title
G01	Cover Sheet
C01	TESC, Grading, Surfacing and Utilty Plan
C02	TESC, Grading, Surfacing and Utility Details
S01	Structural Plans, General Notes and Details
E01.0	Electrical Legends & Symbols
E01.1	Electrical Abbreviations
E02.0	Electrical Site Plan
E02.0TP	Electrical Site Plan - Temporary
E09.0	Electrical Room Enlarged Plan
E10.0	Electrical One-Line Diagram
E10.0R	Electrical One-Line Diagram - Removal
E10.0TP	Electrical One-Line Diagram - Temporary
E10.1	Electrical Riser Diagram
E10.1R	Electrical Riser Diagram - Removal
E10.1TP	Electrical Riser Diagram - Temporary
E10.2	MDB-1 Schedule & Loads Calcs
E10.3	Panel Schedules
E11.0	Service Equipment - Enlarged Plan
E11.1	Service Equipment Elevation
E11.2	Service Equipment - Grounding Plan
E11.3	General Wiring Diagram
E12.0	Grounding Details

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

THE PORT OF TACOMA IS CURRENTLY ACCEPTING SEALED BIDS FOR CONSTRUCTION OF THE FOLLOWING:

MAINTENANCE BUILDING BACK-UP GENERATOR

PROJECT NO. 101610.01 | CONTRACT NO. 072074

Scope of Work:	The Work required for this Project includes: Install a Cummins DFEK Commercial Diesel Generator Set, 500kW Standby 60Hz, to power the Port of Tacoma Maintenance shop under a power outage event. The Cummins generator will be purchased by the Port of Tacoma and contractor will install the generator ready for use.
Bid Estimate:	Estimated cost range is $300,000 to $400,000, plus Washington State Sales Tax (WSST).
Bid Date/Time/ Location:	Bids will be received at the Front Reception Desk, Port Administration Office, One Sitcom Plaza until **2:00 P.M. on 08/21/2024,** at which time they will be publicly opened and read aloud and the apparent low bid will be determined.
Pre-Bid Conference and Site Tour:	A pre-Bid conferences and site visit have been set for 07/31/2024 at 9:00 AM. The site visit will convene at the Port's Administrative building, located at One Sitcum Plaza. The following Personal Protective Equipment is required for the site visit: sturdy shoes and reflective vest. Attendees will be required to sign a Release and Acceptance of Responsibility and Acknowledgment of Risks Form prior to entering the site and shall provide their own Personal Protection Equipment (PPE) as required above.
Bid Security:	Each Bid must be accompanied by a Bid security in an amount equal to five (5) percent of the Base Bid in a form allowed by the Instructions to Bidders.
Contact Information:	Any to the Port may be emailed to procurement@portoftacoma.com. No oral responses will be binding by the Port. Questions will not be accepted after seven (7) days prior to the Bid Date.

Bidding Documents:	Plans, Specifications, Addenda, and Plan Holders List for this Project are available on-line through The Port of Tacoma's Website portoftacoma.com. Click on "Contracts," "Procurement," and then the Procurement Number Required. Bidders must subscribe to the Holder's List on the right hand side of the screen in order to receive automatic email notification of future addenda and to be placed on the Holder's List. Contact procurement@portoftacoma.com with questions. Holder' s Lists will be updated regularly. Additional Instructions available in Section 00 21 00 - Instructions to Bidders.
Public Works Training Requirements:	Effective July 1, 2019, all businesses are required to have training before bidding on public works projects and prevailing wage under RCW 39.04.359 and RCW 39.12, or is on the list of exempt businesses maintained by the Department of Labor and Industries. The bidder must designate a person or persons to be trained on these requirements. The training will be provided by the Department of Labor and Industries or by a training provider whose curriculum is approved by the Department of Labor and Industries. Please refer to Labor and Industries' web site (https://www.lni.wa.gov/TradesLicensing/PrevWage/Contractors/Training.asp?utm_medium=email&utm_source=govdelivery) for more information and training dates, requirements, and exemptions. Failure to attend this training could result in a determination of "not responsible" and the bidder not being awarded a public works contract.

END OF SECTION

PART 1 - SUMMARY

1.01 DEFINITIONS

All definitions set forth in the Agreement, the General Conditions of the Contract for Construction, and in other Contract Documents are applicable to the Bidding Documents.

A. Addenda" are written or graphic instruments issued prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications, or corrections.

B. "Award" means the formal decision by the Port of Tacoma ("Port") notifying a Responsible Bidder with the lowest responsive Bid of the Port's acceptance of the Bid and intent to enter into a Contract with the Bidder.

C. The "Base Bid" is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents.

D. A "Bid" is a complete and properly signed proposal to do the Work, submitted in accordance with the Bidding Documents.

E. The "Bid Date" is the day and hour specified in the Bidding Documents, as may be changed through an Addendum, by which Bidders are required to submit Bids to the Port.

F. The "Bid Form" is the form(s) included with the Bidding Documents, with Specification Section 00 41 00, through which a Bidder submits a Bid.

G. A "Bidder" is a person or entity who submits a Bid.

H. The "Bidding Documents" include the Advertisement or Invitation to Bid, Instructions to Bidders, the Bid Form, any other sample bidding and contract forms, the Bid Bond, and the proposed Contract Documents, including any Addenda issued prior to the Bid Date.

I. The "Contract Documents" proposed for the Work consist of the Agreement, the General Conditions of the Contract (as well as any Supplemental, Special, or other Conditions included in the project manual), the Drawings, the Specifications, and all Addenda issued prior to, and all modifications issued after, execution of the Contract.

J. The "Schedule of Unit Prices" is a separate schedule on the Bid Form for Unit Pricing as an all-inclusive price per unit of measurement for materials, equipment, or services as described in the Bidding Documents or in the proposed Contract Documents for the optional use of the Port. Quantities are not predictions of amounts anticipated. The Port may, but is not obligated to, accept a Schedule of Unit Price if it accepts the Base Bid .The Schedule of Unit Prices are not factored into the evaluation of determining the low bid amount and are not included as part of the bid award amount.

1.02 BIDDER'S REPRESENTATIONS

A. By making its Bid, each Bidder represents that:

1. BIDDING DOCUMENTS. The Bidder has read and understands the Bidding Documents, and its Bid is made in accordance with them.

2. PROJECT MANUAL. The Bidder has checked its copies of the project manual (if any) with the table of contents bound therein to ensure the project manual is complete.

3. EXAMINATION. The Bidder has carefully examined and understands the Bidding Documents, the Contract Documents (including, but not limited to, any liquidated damages and insurance provisions), and the Project site, including any existing buildings, it has familiarized itself with the local conditions under which the Work is to be performed, has correlated its observations with the requirements of the proposed Contract Documents, and it has satisfied itself as to the nature, location, character, quality, and quantity of the Work, the labor, materials, equipment, goods, supplies, work, services, and other items to be furnished, and all other requirements of the Contract Documents. The Bidder has also satisfied itself as to the conditions and other matters that may be encountered at the Project site or affect performance of the Work or the cost or difficulty thereof, including but not limited to, those conditions and matters affecting transportation, access, disposal, handling and storage of materials, equipment and other items; availability and quality of labor, water, electric power and utilities; availability and condition of roads; climatic conditions and seasons; physical conditions at the Project site and the surrounding locality; topography and ground surface conditions; and equipment and facilities needed preliminary to, and at all times during, the performance of the Work. The failure of the Bidder to fully acquaint itself with any applicable condition or matter shall not in any way relieve the Bidder from the responsibility for performing the Work in accordance with, and for the Contract Sum and within the Contract Time provided for in, the Contract Documents.
4. LICENSE REQUIREMENTS. Bidders shall be registered and shall hold such licenses as may be required by the laws of Washington, including a certificate of registration in compliance with RCW 18.27, for the performance of the Work specified in the Contract Documents.
5. NO EXCEPTIONS. Bids must be based upon the materials, systems, and equipment described and required by the Bidding Documents, without exception.

1.03 BIDDING DOCUMENTS

A. COPIES

1. Complete Sets. Bidders shall use complete sets of Bidding Documents in preparing Bids and are solely responsible for obtaining updated information. The Port does not assume any responsibility for errors or misinterpretations resulting from the use of incomplete and/or superseded sets of Bidding Documents.
2. Conditions. The Port makes copies of the Bidding Documents available only for the purpose of obtaining Bids on the Work and does not confer a license or grant permission for any other use.
3. Legible Documents. To the extent any Drawings, Specifications, or other Bidding Documents are not legible, it is the Bidder’s responsibility to obtain legible documents.

B. INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

1. Duty to Notify. Bidders shall promptly notify the Port in writing of any ambiguity, inconsistency, or error that they may discover upon examination of the Bidding Documents or of the site and local conditions.
2. Written Request. Bidders requiring clarification or interpretation of the Bidding Documents shall make a written email request to procurement@portoftacoma.com at least THREE (3) days prior to the Bid Date.

3. Request to Modify Responsibility Criteria. No later than XXX (##) days prior to the Bid Date, a potential Bidder may request in writing that the Port modify the Responsibility Criteria. The Port will evaluate the information submitted by the potential Bidder and respond before the Bid Date. If the evaluation results in a change of the Criteria, the Port will issue an Addendum identifying the new Criteria.
4. Addenda. The Bidder shall not rely on oral information provided during site visits. Verbal statements made by representatives of the Port are for informational purposes only. Any interpretation, correction, or change of the Bidding Documents will be made solely by written Addendum.
5. Site Visits. Any site visits are provided as a courtesy to potential Bidders to assist them in becoming familiar with the Project site conditions. However, only the Bidding Documents, including any issued Addenda, may be relied upon by Bidders.
6. Utilities and Runs. The Bidder should assume that the exact locations of any underground or hidden utilities, underground fuel tanks, and plumbing and electrical runs may be somewhat different from any location indicated in the surveys or Contract Documents.

C. SUBSTITUTIONS

1. For substitution requests during bidding, email the request with necessary backup information to procurement@portoftacoma.com.

D. ADDENDA

1. Distribution. All Addenda will be written and will be distributed by the Port Procurement Department.
2. Verification and Acknowledgment of Receipt. Prior to submitting a Bid, each Bidder shall ascertain that it has received all Addenda issued. Each Bidder shall acknowledge its receipt and consideration of all Addenda in its Bid.

1.04 BIDDING PROCEDURE

A. FORM AND STYLE OF BIDS

1. Form. Bids (including required attachments) shall be submitted on forms identical to the Bid Form included with the Bidding Documents.
2. Entries on the Bid Form. All blanks on the Bid Form shall be filled in.
3. Figures. All sums shall be expressed in figures, not words. Portions of the Bid Form may require the addition or multiplication of component bids to a total or the identification of component amounts within a total. In case of discrepancy between unit prices listed and their sum(s), the unit prices listed shall govern (rather than the sum).
4. Initial Changes. Any interlineation, alteration, or erasure shall be initialed by an authorized representative of the Bidder.
5. No Conditions. The Bidder shall make no conditions or stipulations on the Bid Form, nor qualify its Bid in any manner.

6. Identity of Bidder. The Bidder shall include in the specified location on the Bid Form, the legal name of the Bidder and, if requested, a description of the Bidder as a sole proprietor, a partnership, a joint venture, a corporation, or another described form of legal entity. The Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. The Port verifies signature authority on the Labor and Industries website https://fortress.wa.gov/lni/bbip/Search.aspx under the contractor registration business owner information. If the business owner information is not current, the bidder shall show proof of authority to sign at the request of the Port. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder
7. Bid Amounts Do Not Include Sales Tax. The Work to be performed constitutes a "retail sale" as this term is defined in RCW 82.04.050. Thus, the Base Bid amount shall include in the sum stated all taxes imposed by law, EXCEPT WASHINGTON STATE AND LOCAL SALES TAX. The engaged Contractor will pay retail sales tax on all consumables used during the performance of the Work and on all items that are not incorporated into the final Work; this tax shall be included in the Base Bid price and in any other prices set forth on the Bid Form. The Port will pay state and local retail sales tax on each progress payment and final payment to the engaged Contractor for transmittal by the Contractor to the Washington State Department of Revenue or to the applicable local government.
8. Schedule of Unit Prices. All Unit Prices under this schedule shall be bid. The Port reserves the right, but is not obligated, to reject any Bid on which all requested Schedule of Unit Prices are not bid.

B. SUBMISSION OF BIDS

1. Procedure. The Bid, and other documents required to be submitted with the Bid, shall be sent electronically via an attached PDF to procurement@portoftacoma.com by the bid date and time indicated on the Invitation to Bid, or any extension thereof made by Addendum. Bids received after the Bid Date and time specified shall not be considered.
2. Delivery. The Bidder assumes full responsibility for timely delivery at the location designated for receipt of Bids.

C. MODIFICATION OR WITHDRAWAL OF BID

1. After the Bid Date. A Bid may not be modified, withdrawn, or canceled by the Bidder during a sixty (60) day period following the Bid Date, and each Bidder so agrees by virtue of submitting its Bid.

1.05 CONSIDERATION OF BIDS

A. OPENING OF BIDS: Unless stated otherwise in the Invitation to Bid or an Addendum, the properly identified Bids received on time will be reviewed by the Port for responsiveness. An abstract of the Base Bids will be made available to Bidders and other interested parties.

B. REJECTION OF BIDS: The Port shall have the right, but not the obligation, to reject any or all Bids for any reason, or for no reason, or to reject a Bid which is in any way incomplete or irregular.

C. BIDDING MISTAKES: The Port will not be obligated to consider notice of claimed Bid mistakes received more than 24 hours after the Bid Date. In accordance with Washington law, a low Bidder that claims error and fails to enter into the Contract is prohibited from Bidding on the Project if a subsequent call for Bids is made for the Project.

D. ACCEPTANCE OF BID (AWARD)

1. Intent to Accept. The Port intends, but is not bound, to Award a Contract to the Responsible Bidder with the lowest responsive Bid, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Port has the right to waive any informality or irregularity in any Bid(s) received and to accept the Bid which, in its judgment, is in its own best interests.
2. Requirements for Award. Before the Award, the lowest responsive Bidder must be deemed Responsible by the Port and must satisfy all Award Requirements.

E. BID PROTEST PROCEDURES

1. Procedure. A Bidder protesting, for any reason, the Bidding Documents, a Bidding procedure, the Port's objection to a Bidder or a person or entity proposed by the Bidder, including but not limited to, a finding of non-Responsibility, the Award of the Contract or any other aspect arising from, or relating in any way to, the Bidding shall cause a written protest to be filed with the Port within two (2) business days of the event giving rise to the protest. (Intermediate Saturdays, Sundays, and legal holidays are not counted as business days.) The written protest shall include the name of the protesting Bidder, the bid solicitation number and title under which the protest is submitted, a detailed description of the specific factual and legal grounds for the protest, copies of all supporting documents, evidence that the apparent low bidder has been given notice of the protest, and the specific relief requested. The written protest shall be sent by email to procurement@portoftacoma.com.
2. Consideration. Upon receipt of the written protest, the Port will consider the protest. The Port may, within three (3) business days of the Port's receipt of the protest, provide any other affected Bidder(s) the opportunity to respond in writing to the protest. If the protest is not resolved by mutual agreement of the protesting Bidder and the Port, the Contracts Director of the Port, or his or her designee, will review the issues and promptly furnish a final and binding written decision to the protesting Bidder, and any other affected Bidder(s), within six (6) business days of the Port's receipt of the protest. (If more than one (1) protest is filed, the Port's decision will be provided within six (6) business days of the Port's receipt of the last protest.) If no reply is received from the Port during the six (6) business-day period, the protest will be deemed rejected.
3. Waiver. Failure to comply with these protest procedures will render a protest waived.
4. Condition Precedent. Timely and proper compliance with, and exhaustion of, these protest procedures shall be a condition precedent to any otherwise permissible judicial consideration of a protest.

1.06 POST BID INFORMATION

A. THE LOWEST RESPONSIVE BIDDER SHALL:

1. Have a current state Unified Business Identifier number;
2. If applicable, have industrial insurance coverage for the Bidder's employees working in Washington as required in RCW 51;
3. Have an employment security department number as required in RCW 50;
4. Have a state excise tax registration number as required in RCW 82; and
5. Not be disqualified from bidding on any public works contract under RCW 39.06.010 (unregistered or unlicensed contractors) or RCW 39.12.065(3) (prevailing wage violations).

B. INFORMATION FROM APPARENT LOW BIDDER

1. Submittal. Within 24 hours of the Bid Date, the apparent low Bidder shall submit to the Port the following documents executed by an authorized company officer: written confirmation that the person signing the Bid on behalf of the Bidder was duly authorized, a detailed breakdown of the Bid in a form acceptable to the Port, and other information required by Port procedures, including:

   a. The Bidder's recent job resume;

   b. Resumes of the Bidder's proposed Project Manager and Superintendent;

   c. A list of all contracts of the Bidder terminated prematurely within the past five years; and

   d. A list of any L&I, environmental, or building citations or notices of violation issued to the Bidder within the past five years.

2. To be considered Responsible, submit documentation showing the apparent low bidder meets the following supplemental criteria applicable to this Project:

   a. The Bidder must demonstrate that it has the ability, capacity, and skill to perform the Contract;

   b. The Bidder must have the character, integrity, reputation, judgment, experience, and efficiency to perform the Contract;

   c. The Bidder must demonstrate that it has the ability to perform the Contract within the time specified;

   d. The demonstrated ability of the Bidder, in the last three (3) years, to perform and successfully complete public works projects of a similar scope and scale to the Project;

   e. Demonstration by the Bidder and listed Sub-Bidders that their proposed Project Managers have a minimum of three (3) years of successful experience in project management of public works projects of a similar scope and complexity to the Project; and

   f. The Bidder must not currently be a party to a formal dispute resolution process with the Port (i.e. a pending mediation, arbitration or litigation).

3. Failure to provide any of the above information in a timely manner will constitute an event of breach permitting forfeiture of the Bid security.

4. Bidder Responsibility. The Bidder will be required to establish to the satisfaction of the Port, the reliability and Responsibility of itself and the persons or entities proposed to furnish and perform the Work described in the Bidding Documents. If requested, the Bidder shall meet with the Port to discuss the Bid, including any pricing, the Bid components, and any assumptions made by the Bidder.

1.07 PERFORMANCE BOND, LABOR AND MATERIAL PAYMENT BOND, AND INSURANCE

A. BOND REQUIREMENTS: Within fifteen (15) days after the Port's Notice of Award of the Contract, the successful Bidder shall obtain and furnish statutory bonds pursuant to RCW 39.08 covering the faithful performance of the Contract and the payment of all obligations arising thereunder in the form and amount prescribed in the Contract Documents. The cost of such bonds shall be included in the Base Bid.

B. TIME OF DELIVERY AND FORM OF BONDS: The successful Bidder shall deliver an original copy of the required bonds to the Port, 1 Sitcum Plaza, Tacoma, WA 98421, within the time specified in the Contract Documents.

C. INSURANCE: a certificate of insurance from the Bidder's insurance company that meets or exceeds all requirements of the Contract Documents.

D. GOVERNMENTAL REQUIREMENTS: Notwithstanding anything in the Bidding or Contract Documents to the contrary, the Bidder shall provide all bonding, insurance, and permit documentation as required by governmental authorities having jurisdiction for any portions of the Project.

1.08 FORM OF AGREEMENT

A. FORM TO BE USED: The Contract for the Work will be written on the form(s) contained in the Bidding Documents, including any General, Supplemental or Special Conditions, and the other Contract Documents included with the project manual.

B. CONFLICTS: In case of conflict between the provisions of these Instructions and any other Bidding Document, these Instructions shall govern. In case of conflict between the provisions of the Bidding Documents and the Contract Documents, the Contract Documents shall govern.

C. CONTRACT DELIVERY. Within fifteen (15) days after Notice of Award, the Bidder shall submit a signed Contract to the Port in the form tendered to the Bidder and without modification.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for substitutions.

1.02 DEFINITIONS/CLARIFICATIONS

A. Substitutions. Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

B. The Contract Documents include performance specifications for products and equipment which meet Project requirements. In those cases where a representative item or manufacturer is named in the specification, it is provided for the sole purpose of identifying a product meeting the required functional performance, and where the words “or equal” are used, a substitution request as further described, is not required.

C. Where non-competitive or sole source products or manufacturers are explicitly specified with the words “or approved equal,” or “Engineer approved equal,” or “as approved by the Engineer” are used, they shall be taken to mean “or approved equal.” In these cases a substitution request as further described in this Section, is required.

1.03 SUBMITTALS

A. Substitution Request Form. Use copy of form located at the end of this Section.

B. Pre-Bid Substitution Requests. Submit one (1) PDF of the Substitution Request Form along with all supporting documentation for consideration of each request. Identify product, fabrication, or installation method to be replaced. Include Drawing numbers and titles. Substitution requests prior to the Bid Date may originate directly from a prime Bidder, or from a prospective Sub-Bidder.

1. Documentation. Show compliance with requirements for substitutions with the following, as applicable:

a. Statement indicating why specified product, fabrication, or installation cannot be provided.

b. Coordination information, including a list of changes or modifications needed to other parts of the Work that will be necessary to accommodate proposed substitution.

c. Product Data, including drawings and descriptions of products, fabrication, and installation procedures.

d. Samples, where applicable or requested.

e. Certificates and qualification data, where applicable or requested.

f. Research reports evidencing compliance with building code in effect for the Project.

2. Engineer's Action. Engineer will review substitution requests if received through the Procurement and Question Submission Portal at least seven (7) days prior to the Bid Date (Portal link is accessible via this specific procurements website. See left side of page.) A direct link is also available here: Procurement and Question Portal Link. No oral responses will be binding by the Port.

a. Forms of Acceptance. Substitution requests will be formally accepted via written addendum prior to the Bid Date. Bidders shall not rely upon approvals made in any other manner.

b. Use product originally specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.

c. The Port's decision of approval or disapproval of a proposed substitution shall be final.

Instructions for utilizing the portal can be found here: Procurement and Question Submission Portal Instructions.

C. Post-Award Substitution Requests must be submitted by the Contractor and not a Subcontractor nor Supplier.

1. Documentation. Show compliance with requirements for substitutions with the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information, including a list of changes or modifications needed to other parts of the Work that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification Section. Significant qualities may include, but are not limited to, attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified. ·

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Samples, where applicable or requested.

f. Certificates and qualification data, where applicable or requested.

g. List of similar installations for completed projects with project names and addresses. Also provide names and addresses of the applicable architect, engineer, and owner.

h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

i. Research reports evidencing compliance with building code in effect for the Project.

j. Comparison of the approved Baseline Project Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

k. Cost information, including a proposal of change, if any, in the Contract Sum.

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Engineer's Action. If necessary, Engineer will request additional information or documentation for evaluation within seven (7) calendar days of receipt of a request for substitution. Engineer will notify Contractor through Port of acceptance or rejection of proposed substitution within fifteen (15) calendar days of receipt of request, or seven (7) calendar days of receipt of additional information or documentation, whichever is later.
    a. Forms of Acceptance. Change Order or Minor Change in Work.
    b. Use product originally specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.
3. Substitutions for Cause. Submit requests for substitution immediately upon discovery of need for change, but not later than fourteen (14) days prior to date required for preparation and review of related submittals.
    a. Conditions. Engineer will consider Contractor's request for substitution when the following conditions are satisfied:
        1) Requested substitution is consistent with the Contract Documents and will produce indicated results.
        2) Requested substitution will not adversely affect the Baseline Project Schedule.
        3) Requested substitution has received necessary approvals of authorities having jurisdiction.
        4) Requested substitution is compatible with other portions of the Work.
        5) Requested substitution has been coordinated with other portions of the Work.
        6) Requested substitution provides specified warranty.
        7) If requested substitution involves more than one (1) contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
4. Substitutions for Convenience. Engineer will consider Contractor’s requests for substitution if received within fourteen (14) days after the Notice of Award.
    a. Conditions. Engineer will consider Contractor's request for substitution when the following conditions are satisfied:
        1) Requested substitution offers Port a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities· Port must assume. Port's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Port, and similar considerations.
        2) Requested substitution does not require extensive revisions to the Contract Documents.
        3) Requested substitution is consistent with the Contract Documents and will produce indicated results.
        4) Requested substitution will not adversely affect the Baseline Project Schedule.
        5) Requested substitution has received necessary approvals of authorities having jurisdiction.

6) Requested substitution is compatible with other portions of the Work.

7) Requested substitution has been coordinated with other portions of the Work.

8) Requested substitution provides specified warranty.

9) If requested substitution involves more than one (1) contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

D. Substitutions will not be considered when:

1. Indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this Section.

2. Acceptance will require substantial revision of Contract Documents or other items of the Work.

3. Submittal for substitution request does not include point-by-point comparison of proposed substitution with specified product.

1.04 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

PROJECT TITLE: Maintenance Building Back-Up Generator **PROJECT NO.: 101610.01**

SUBMITTED BY: _____ CONTRACT NO.: 072074

PRIME/SUB/SUPPLIER: _____ DATE: _____

Specification Title: _____ Section No.: _____

Description: _____ Paragraph: _____

_____ Page No.: _____

Proposed Substitution: _____

Trade Name: _____ Model No.: _____

Manufacturer: _____

Address: _____ Phone No.: _____

Installer: _____

Address: _____ Phone No.: _____

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-Point comparative data attached - REQUIRED

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ A/E: _____

Address: _____

Owner: _____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

Supporting Data Attached:

☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ Other:_____

_____

Applicable to Substitution Requests During Construction:

Proposed to Port for accepting substitution: $_____

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] ____ # days.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.

- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay Baseline Project Schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted By: _____

Signed By: _____ Firm: _____

Address: _____

_____

Telephone: _____ Email: _____

Attachments: _____

_____

A/E's REVIEW AND RECOMMENDATION

☐ Approved Substitution

☐ Approved Substitution as Noted

☐ Reject Substitution - Use specified materials.

☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

ENGINEER'S REVIEW AND ACTION

☐ Substitution Approved - Make submittals in accordance with this Specification Section. If during construction, prepare Change Order.

☐ Substitution Approved as Noted - Make submittals in accordance with this Specification Section. If during construction, prepare Change Order.

☐ Substitution Rejected - Use specified materials.

☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

END OF SECTION

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This Section provides the notification required for disclosure of asbestos, lead-containing or other hazardous materials.

1.02 HAZARDOUS MATERIALS NOTICE

A. The Port is reasonably certain that asbestos and lead will not be disturbed by the project. If the Contractor encounters material suspected of containing lead or asbestos which will interfere with the execution of the work, the Contractor shall stop work and notify the Engineer.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

BIDDER'S NAME: _____

PROJECT TITLE: **MAINTENANCE BUILDING BACK-UP GENERATOR**

The undersigned Bidder declares that it has read the Contract Documents (including documents provided by reference), understands the conditions under which the Work will be performed, has examined the Project site, and has determined for itself all situations affecting the Work herein Bid upon. Bidder proposes and agrees, if this Bid is accepted, to provide at Bidder's own expense, all labor, machinery, tools, materials, etc., including all Work incidental to, or described or implied as incidental to such items, according to the Contract Documents, and that the Bidder will complete the Work within the time stated, and that Bidder will accept in full the lump sum or unit price(s) set forth below:

ITEM NO.	DESCRIPTION OF ITEM	QTY	UOM	UNIT PRICE	EXTENDED PRICE (QTY. x UNIT PRICE)
1	Project Admin	1		LS	
2	Mobilization	1		LS	
3	Construction Work and Material	1		LS	
4	Electrical Work and Material	1		LS	
5	Demobilization	1		LS	

TOTAL BID AMOUNT	
10.3% WASHINGTON STATE SALES TAX (WSST) ON BASE BID SUBTOTAL	
BID TOTAL (WITH WSST)	

Note: Show prices in figures only.

Evaluation of Bids. In accordance with the provisions of the Contract Documents, Bids will be evaluated to determine the lowest Base Bid Subtotal offered by a responsible Bidder submitting a responsive Bid.

Schedule of Unit Prices. The unit prices are proposed to apply only in the event of additions to, or deletions from, the work required and ordered. All prices shall include complete installation without Washington State Sales Tax. The bidder shall propose a price for each item; failure to propose a price for each item may render the bid non-responsive. The Port reserves the right to accept or reject the unit prices proposed.

Trench Excavation Safety Provision. If the bid amount contains work which requires trenching exceeding a depth of four (4) feet, all costs for trench safety shall be included in the Base Bid and indicated below for adequate trench safety systems in compliance with RCW 39.04 and WAC 296-155-650. Bidder shall include a lump sum amount, excluding Washington State Sales Tax. If trench excavation safety provisions do not pertain to the Work, the Bidder should enter "N.A." or "Not Applicable" in the blank below.

Trench Excavation Safety: _____(Total in Written Figures Only)

Principal Subcontractors/Suppliers. For Bids greater than one million ($1,000,000) dollars, the Bidder shall list below the name of each subcontractor or supplier to whom the Bidder proposes to subcontract the portions of the work listed below, or name itself for the work, in accordance with RCW 39.30.060.

Work to be preformed	License Number	Name of Firm
HVAC (Heating, Ventilation, and Air Conditioning) Work		
Plumbing Work		
Electrical Work		
Structural Steel Installation		
Rebar Installation		

Non-Collusion Representation. The Bidder declares under penalty of perjury that the Bid submitted is genuine and not a sham or collusive bid, or made in the interest or on behalf of any person or firm not therein named; and further represents that the Bidder has not directly or indirectly induced or solicited any other bidder to submit a sham bid, or encouraged any other person or corporation to refrain from bidding; and that the Bidder has not in any manner sought by collusion to secure to the Bidder an advantage over any other bidder or bidders.

RCW 39.04.350 Certification. The Bidder represents and certifies, under penalty of perjury, that within the three- (3-) year period immediately preceding the Bid Date, the Bidder has not been determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries, nor through a civil judgment entered by a court of limited or general jurisdiction, to have willfully violated, as defined in RCW 49.48.082, any provision of Chapters 49.46, 49.48, nor 49.52 RCW.

Addenda. Bidder acknowledges receipt and acceptance of all Addenda through No. ____ (Identify Last Addenda By Number)

Apprenticeship Requirements. For Bids greater than one million ($1,000,000) dollars, the apprentice labor hours required for this project are fifteen (15) percent of the total labor hours. The Bidder agrees to utilize this level of apprentice participation.

_____	_____
Name of Firm	Date
_____	_____
Signature	By Title
_____	_____
Mailing Address	City, State Zip Code

_____	_____
Telephone Number	Email Address
_____	_____
WA State Contractor's License No.	Employment Security Department No.

_____

Identification of Bidder as a sole proprietor, a partnership, a joint venture, a corporation, or another described form of legal entity

END OF SECTION

This page intentionally left blank

KNOW ALL MEN BY THESE PRESENTS:

That we, _____, as Principal, and _____, as Surety, are held and firmly bound unto the PORT OF TACOMA as Obligee, in the penal sum of _____ Dollars, for the payment of which the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigned, jointly and severally, by these present.

The condition of this obligation is such that if the Obligee shall make any award to the Principal for _____, according to the terms of the proposal or bid made by the Principal therefor, and the Principal shall duly make and enter into a contract with the Obligee in accordance with the terms of said proposal or bid and award and shall give bond for the faithful performance thereof, with Surety or Sureties approved by the Obligee; or, if the principal shall, in case of failure to do so, pay and forfeit to the Obligee the penal amount of the deposit specified in the call for bids, then this obligation shall be null and void; otherwise it shall be and remain in full force and effect and the Surety shall forthwith pay and forfeit to the Obligee, as penalty and liquidated damages, the amount of this bond.

SIGNED, SEALED AND DATED THIS _____ DAY OF _____, 20___

BY _____
PRINCIPAL

BY _____
SURETY

_____

_____

_____

AGENT AND ADDRESS

Note: Bidder may submit Surety's bid bond form, provided it is similar in substance, made out in the name of the Port of Tacoma, and that the agent’s name and address appear as specified. Bonds containing riders limiting responsibility for toxic waste or limiting the term of responsibility will be rejected.

END OF SECTION

This page intentionally left blank

THIS IS NOT TO BE SUBMITTED WITH A BID.

THE LOW RESPONSIVE BIDDER SHALL BE REQUIRED TO COMPLETE THIS RESPONSIBILITY DETAIL FORM AS SPECIFIED IN SECTION 00 21 00 - INSTRUCTIONS TO BIDDERS. **THIS COMPLETED RESPONSIBILITY DETAIL FORM SHALL BE SUBMITTED ELECTRONICALLY (PDF) VIA EMAIL TO THE CONTACT(S) IDENTIFIED IN THE LOW RESPONSIVE BIDDER SELECTION NOTIFICATION.**

BIDDER'S COMPANY NAME: _____

For the below Mandatory Bidder Responsibility Criteria, please mark the appropriate choice.

1.01 MANDATORY BIDDER RESPONSIBILITY CRITERIA

A. The Bidder shall meet the following mandatory responsibility criteria as described in RCW 39.04.350(1). The Bidder shall be rejected as not responsible if any answer to questions 1 through 5 is "No" or any answer to questions 6 through 8 is "Yes."

1. Does the Bidder have a Certificate of Registration in compliance with RCW 18.27?

   ☐ Yes ☐ No

2. Does the Bidder have a current Washington State Unified Business Identifier number?

   ☐ Yes ☐ No

3. Does the Bidder have Industrial Insurance Coverage for the Bidder's employees working in Washington State as required in RCW 51?

   ☐ Yes ☐ No

4. Does the Bidder have an Employment Security Department number as required in RCW 50?

   **__Attach__ letter dated within six (6) months of Bid Date.*

   **Request a letter electronically by clicking on the following link https://fortress.wa.gov/esd/twt/pwcinternet/ or by emailing a request to publicworks@esd.wa.gov.*

   ☐ Yes ☐ No

5. Does the Bidder have a Washington State Excise Tax Registration number as required in RCW 82?

   ☐ Yes ☐ No

6. Has the Bidder been disqualified from bidding on any public works project under RCW 39.06.010 or 39.12.065(3)?

   ☐ Yes ☐ No

7. Has the Bidder violated RCW 39.04.370 more than one (1) time as determined by the Washington State Department of Labor and Industries?

   ☐ Yes ☐ No

8. Has the Bidder ever been found to be out of compliance with Apprenticeship Utilization requirements of RCW 39.04.320?

   ☐ Yes ☐ No

9. Has the Bidder ever been found to have willfully violated, as defined in RCW 49.48.082, any provision of Chapters 49.46, 49.48, or 49.52 RCW within the three- (3-) year period immediately preceding the date of this bid solicitation?

   ☐ Yes ☐ No

10. Has the Bidder completed the training required by RCW 39.04.350, or is the Bidder on the list of exempt businesses maintained by the Department of Labor and Industries?

    ☐ Yes ☐ No

If any answer to questions 1 through 5 is "No" or any answer to questions 6 through 8 is "Yes" - **STOP HERE** and contact the Contract Administrator. The Bidder is not responsible for this Work. Otherwise proceed to 1.02. **Provide attached to this completed form documentation to confirm responsibility criteria.**

For remaining criteria below, check or fill-out the appropriate item. Based upon the answer provided by the Bidder, the Port may request additional information or seek further explanation. As needed, provide backup documentation for any explanations listed below.

1.02 CONTRACT AND REGULATORY HISTORY

A. The Port will evaluate whether the Bidder's contract and regulatory history demonstrates an acceptable record of past project performance and consistent responsibility. The Bidder shall answer the following questions. The Bidder may be rejected as not responsible if any answer to questions 1 through 5 below is "Yes."

   1. Has the Bidder had a contract terminated for cause or default in the last five (5) years?

      ☐ Yes, **If YES, explain below.** ☐ No

      _____

   2. Has the Bidder required a Surety to take over all, or a portion of, a project to cure or respond to an asserted default or material breach of contract on the part of the Bidder on any public works project in the last five (5) years?

      ☐ Yes, **If YES, explain below.** ☐ No

      _____

   3. Have the Bidder and major Sub-Bidders been in bankruptcy, reorganization, and/or receivership on any public works project in the last five (5) years?

      ☐ Yes, **If YES, explain below.** ☐ No

      _____

4. Have the Bidder and major Sub-Bidders been disqualified by any state or local agency from being awarded and/or participating on any public works project in the last five (5) years?

   ☐ Yes, **If YES, explain below.** ☐ No

   _____

5. Are the Bidder and major Sub-Bidders currently a party to a formal dispute resolution process with the Port (i.e., a pending mediation, arbitration, or litigation)?

   ☐ Yes, **If YES, explain below.** ☐ No

   _____

1.03 ACCIDENT/INJURY EXPERIENCE

A. The Port will evaluate the Bidder's accident/injury Experience Modification Factor ("EMF") from the Washington State Department of Labor and Industries to assess whether the Bidder has an acceptable safety record preventing personal injuries on projects.

B. List the Bidder's accident/injury EMF for the last five (5) years. An experience factor is calculated annually by the Washington State Department of Labor and Industries.

Year	Effective Year	Experience Factor
1		
2		
3		
4		
5		

If the Bidder has received an EMF of greater than 1.0 for any year, explain the cause(s) of the designation and what remedial steps were taken to correct the EMF. The Bidder may be rejected as not responsible if the Bidder's EMF is greater than 1.0 and sufficient remedial steps have not been implemented.

_____

1.04 WORK PERFORMED BY BIDDER

A. The Bidder shall state the amount of the Work, as an equivalent to the Base Bid, excluding taxes, insurance, and bonding, the Bidder will execute with its own forces.

_____%

1.05 ADDITIONAL CONTRACTOR INFORMATION

A. As part of completing this Responsibility Detail Form, **submit the following information with the completed Responsibility Detail Form:**

1. Bidder's recent job resume, including a list of similar projects performed and contact information for the similar project owner(s), a brief description of work, start and end dates, and contract amount.

2. Resumes of Bidder's proposed project manager and job superintendent.

B. The Bidder's failure to provide the required project information may result in a determination of the Bidder being declared non-responsible by the Port.

C. The Bidder shall submit this completed, **SIGNED** Responsibility Detail Form electronically (PDF), with all requested backup documentation, via email to the contact(s) noted on the Low Responsive Bidder Selection Notification.

D. The Bidder and its subcontractors to verify that its subcontractors at each tier meet the responsibility criteria as required by RCW 39.06.020 and 39.04.350.

1. Bidder shall verify major subcontractors meet the responsibility criteria required. Fill out one Port of Tacoma Public Works Project Bidder Evaluation Checklist for Subcontractors for each major subcontractor and submit to the Port with this form. Backup documentation is not required to be submitted.

PROJECT: Maintenance Building Back-Up Generator

PROJECT NO.: 101610.01

CONTRACT NO.: 072074

Responsibility Certification Form

The Low responsive Bidder shall complete the Responsibility Detail Form, attach all documentation, and submit to the Port within twenty-four (24) hours following receipt of the Low Responsive Bidder Selection Notification. All forms shall be submitted electronically (PDF) via email to the contact(s) listed on the Selection Notice. Note, the same project may be used to demonstrate experience across multiple categories if applicable.

By completing and signing this Responsibility Detail Form, the Bidder is certifying that the information contained within the Form, the backup documentation, and any additional information requested by the Port is true and complete. The Bidder's failure to disclose the required information or the submittal of false or misleading information may result in the rejection of the Bidder's Bid, revocation of award, or contract termination.

The information provided herein is true and complete.

_____ _____

Signature of Authorized Representative Date

_____

Print Name and Title

PORT OF TACOMA PUBLIC WORKS PROJECT BIDDER EVALUATION CHECKLIST FOR SUBCONTRACTORS

PROJECT TITLE: Maintenance Building Back-Up Generator

BIDDER: _____

CONTRACT AND PROJECT NUMBER: 072074/ 101610.01

This checklist shall be completed by the Bidder and its subcontractors to verify that its subcontractors at each tier meet the responsibility criteria as required by RCW 39.06.020 and RCW 39.04.350.

This checklist should be submitted to the Port of Tacoma Contracts Administrator within twenty-four (24) hours of request.

Document verification information or backup data is not to be submitted to the Port, this information should remain on file with the Contractor and be presented to the Port if requested at a later date.

Item No.	Item	Initials/ Comments
1.	At the time of Bid submittal, have a certificate of registration in compliance with RCW 18.27: Check the L&I site https://fortress.wa.gov/lni/bbip/. Verify that a subcontractor has an electrical contractor license, if required by RCW 19.28, or an elevator contractor license, if required by RCW 70.87.	
2.	While reviewing registration information above, also check contractor's **Employer Liability Certificate** to verify workers' comp (industrial insurance) premium status – current account. Complete a "Submit Contractor Tracking Request" to be notified if the contractor fails to pay workers' comp premiums or renew their contractor registration or if their electrical contractor license is suspended or revoked within one year.	
3.	State excise tax registration number (Department of Revenue). (contractor's Washington State Unified Business Identifier and tax registration number) http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/.	
4.	Not disqualified from bidding on any public works contract under RCW 39.06.010 or RCW 39.12.065(3). Check the Department of Labor and Industries http://www.lni.wa.gov/TradesLicensing/PrevWage/AwardingAgencies/DebarredContractors/.	
5.	Verify subcontractors are registered with the Washington State Employment Security Department (ESD) and have an account number. Request a letter to be sent from the subcontractor electronically by clicking on the following link https://fortress.wa.gov/esd/twt/pwcinternet/ or by emailing a request to publicworks@esd.wa.gov. Include ESD#, UBI#, and business name in the email. Certificate of Coverage letter issued/dated within the last six (6) months.	

Item No.	Item	Initials/ Comments
	Document if subcontractor confirms in writing, under penalty of perjury, that it has no employees and this requirement does not apply.	

END OF SECTION

THIS AGREEMENT is made and entered into by and between the PORT OF TACOMA, a State of Washington municipal corporation, hereinafter designated as the "Port," and:

The "Contractor" is: _____ (Legal Name)

_____ (Address)

_____ (Address 2)

_____ (Phone No.)

The "Project" is: Maintenance Building Back-Up Generator (Title)

101610.01 | 072074 (Project/Contract No.)

Project Location Address 1 (Project Address)

Project Location Address 2 (Project Address 2)

The "Engineer" is: Thais Howard, PE (Engineer)

Director of Engineering (Title)

thoward@portoftacoma.com (Email)

(253) 888-4718 (Phone No.)

The "Contractor's Representative" is: _____ (Representative)

_____ (Title)

_____ (Email)

_____ (Phone No.)

BACKGROUND AND REPRESENTATIONS:

The Port publicly solicited bids on the Contract Documents. The Contractor submitted a Bid to the Port on the _____ day of _____, 20___ to perform the Work.

The Contractor represents that it has the personnel, experience, qualifications, capabilities, and means to accomplish the Work in strict accordance with the Contract Documents, within the Contract Time and for the Contract Price, and that it and its Subcontractors satisfy the responsibility criteria set forth in the Contract Documents, including any supplemental responsibility criteria.

The Contractor further represents that it has carefully examined, and is fully familiar with, all provisions of the Contract Documents, including any Addenda, that it has fully satisfied itself as to the nature, location, difficulty, character, quality, and quantity of the Work required by the Contract Documents and the conditions and other matters that may be encountered at or near the Project site(s), or that may affect performance of the Work or the cost or difficulty thereof, including all applicable safety and site responsibilities, and that it understands and can satisfy all scheduling and coordination requirements and interim milestones.

AGREEMENT:

The Port and the Contractor agree as follows:

1.0 CONTRACTOR TO FULLY PERFORM THE WORK

The Contractor shall fully execute and complete the entire Work for the Project described in the Contract Documents, except to the extent specifically indicated in the Agreement, the General Conditions of the Contract (as well as any Supplemental, Special, or other conditions included in the Project Manual), the Drawings, the Specifications, and all Addenda issued prior to, and all modifications issued after, execution of the Contract.

2.0 DATE OF COMMENCEMENT

The date of commencement of the Work, which is the date from which the Contract Time is measured, shall be fixed as the date of execution of the Contract.

3.0 CONTRACT TIME AND LIQUIDATED DAMAGES

The Contractor shall achieve all interim milestones as set forth in the Contract Documents and Substantial Completion of the entire Work not later than 180 calendar days from execution of the Contract, subject to adjustments of this Contract Time as provided in the Contract Documents. The Contractor shall achieve Final Completion of the entire Work within 30 calendar days of the date on which Substantial Completion is achieved.

Provisions for liquidated damages as a reasonable estimate of future loss, as of the date of this Agreement, are included in the Contract Documents. The parties agree that the stated liquidated damages are reasonable and not penalties individually nor cumulatively.

The liquidated damages for failure to achieve Substantial Completion by the required date shall be $100 per calendar day. After the required Final Completion date, the liquidated damages for failure to achieve Final Completion shall be $100 per calendar day.

Liquidated damages assessed by the Port will be deducted from monies due to the Contractor, or from monies that will become due to the Contractor. The liquidated damages, as specified and calculated herein, shall be levied, cumulatively if applicable, for each and every calendar day that Substantial Completion and/or Final Completion of the Work is delayed beyond the required completion dates, or the completion dates modified by the Port for extensions of the Contract Time.

4.0 CONTRACT PRICE

In accordance with the Contractor's Bid dated _____, the Port shall pay the Contractor in current funds for the Contractor's performance of the Contract, the Contract Price of _____ Dollars ($_____), subject to additions and deductions as provided in the Contract Documents. State and local sales tax is not included in the Contract Price, but will be due and paid by the Port with each progress payment.

5.0 ALTERNATES

6.0 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in the Contract Documents.

This Agreement is entered into as of the day and year first written above:

CONTRACTOR	PORT OF TACOMA
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Execution Date: _____

END OF SECTION

This page intentionally left blank

PERFORMANCE BOND # _____

CONTRACTOR (NAME AND ADDRESS)	**SURETY (NAME AND PRINCIPLE PLACE OF BUSINESS)**
_____	_____
_____	_____
_____	_____
OWNER (NAME AND ADDRESS)	**AGENT OR BROKER (FOR INFORMATION ONLY)**
PORT OF TACOMA	_____
P.O. BOX 1837	_____
TACOMA, WA 98401-1837	_____

KNOW ALL MEN BY THESE PRESENTS:

That _____ as Principal, hereinafter called Contractor, and _____ as Surety, hereinafter called Surety, are held and firmly bound unto the Port of Tacoma as Obligee, hereinafter called the Port, in the amount of _____ Dollars ($_____) for the payment whereof Contractor and Surety bind themselves, their executors, administrators, legal representatives, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS:

Contractor shall execute an agreement with the Port for Maintenance Building Back-Up Generator, Project No. 101610.01/Contract No. 072074, a copy of which Contract is by reference made a part hereof (the term "Contract" as used herein to include the aforesaid agreement together with all the Contract Documents, addenda, modifications, all alterations, additions thereto, deletions therefrom, and any other document or provision incorporated into the Contract) and is hereinafter referred to as the Contract.

This bond is executed and issued pursuant to the provisions of RCW 39.08.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Contractor shall promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

FURTHER:

A. Surety hereby waives notice of any alterations, change orders, modifications, or extensions of time made by the Port.

B. Surety recognizes that the Contract includes provisions for additions, deletions, and modifications to the Work and/or Contract Time and the amounts payable to the Contractor. Subject to the limitations contained in (A) above, Surety agrees that no such addition, deletion, or modification, or any combination thereof, shall avoid or impair Surety's obligation hereunder.

C. Whenever Contractor has been declared by the Port to be in default, and the Port has given Surety notice of the Port's determination of such default, Surety shall promptly (in no event more than fifteen (15) days following receipt of such notice) advise the Port of its intended action to:

   1. Remedy the default within fifteen (15) days following its advice to the Port as set forth above, or

2. Assume within fifteen (15) days, following its advice to the Port as set forth above, completion of the Contract in accordance with the Contract Documents and become entitled to payment of the balance of the Contract Sum, or

3. Pay the Port upon completion of the Contract, in cash, the cost of completion together with all other reasonable costs and expenses incurred by the Port as a result of the Contractor's default, including but not limited to, those reasonable costs and expenses incurred by the Port in its efforts to mitigate its losses, which may include, but are not limited to, attorney's fees and efforts to complete the Work prior to the Surety exercising the options available to it as set forth herein.

D. If the Port shall commence suit and obtain judgment against the Surety for recovery hereunder, then the Surety, in addition to such judgment, shall pay all costs and attorney's fees incurred by the Port in enforcement of its rights hereunder. Venue for any action arising out of, or in connection with, this bond shall be in Pierce County, Washington.

E. No right or action shall accrue on this bond to, or for the use of, any person or corporation other than the Port of Tacoma.

Signed and Sealed the _____ day of _____, 20____.

IMPORTANT: Surety companies executing bonds must have an A.M. Best Rating of "A-, FSC (6)" or higher, have an underwriting limitation of not less than the Contract Sum, and be authorized to transact business in the State of Washington.

SURETY	**CONTRACTOR**
_____	_____
Signature	Signature
_____	_____
Printed Name and Title	Printed Name and Title

Power of Attorney attached.

END OF SECTION

LABOR AND MATERIAL PAYMENT BOND # _____

CONTRACTOR (NAME AND ADDRESS)	**SURETY (NAME AND PRINCIPLE PLACE OF BUSINESS)**
_____	_____
_____	_____
_____	_____
OWNER (NAME AND ADDRESS)	**AGENT OR BROKER (FOR INFORMATION ONLY)**
PORT OF TACOMA	_____
P.O. BOX 1837	_____
TACOMA, WA 98401-1837	_____

KNOW ALL MEN BY THESE PRESENTS:

That _____ as Principal, hereinafter called Contractor, and _____ as Surety, hereinafter called Surety, are held and firmly bound unto the Port of Tacoma as Obligee, hereinafter called the Port, and all others entitled to recovery hereunder, in the amount of _____ Dollars ($_____) for the payment whereof Contractor and Surety bind themselves, their executors, administrators, legal representatives, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS:

Contractor shall execute an agreement with the Port for Maintenance Building Back-Up Generator, Project No. 101610.01/Contract No. 072074, a copy of which Contract is by reference made a part hereof (the term "Contract" as used herein to include the aforesaid agreement together with all the Contract Documents, addenda, modifications, alterations, additions thereto, deletions therefrom, and any other document or provision incorporated into the Contract) and is hereinafter referred to as the Contract.

This bond is executed pursuant to the provisions of RCW 39.08.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Contractor shall promptly make payment to all claimants, as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract and shall indemnify and save the Port harmless from all cost and damage by reason of Contractor's default, then this obligation shall be null and void; otherwise, it shall remain in full force and effect, subject to the following conditions.

A. Surety hereby waives notice of any alterations, change orders, modifications, or extensions of time made by the Port.

B. Surety recognizes that the Contract includes provisions for additions, deletions, and modifications to the Work and/or Contract Time and the amounts payable to the Contractor. Subject to the limitations contained in (A) above, Surety agrees that no such addition, deletion, or modification, or any combination thereof, shall avoid or impair Surety's obligation hereunder.

C. Surety hereby agrees that every person protected under the provisions of RCW 39.08.010 who has not been paid as provided under the Contract, and pursuant to RCW 39.08.010, less any amounts withheld pursuant to statute, and less retainage withheld pursuant to RCW 60.28, after the expiration of a period of thirty (30) days after the date on which the completion of the Contract in accordance with RCW 39.08, may sue on this bond, prosecute the suit to final judgment as may be due claimant, and have execution thereon including recovery of reasonable costs and attorney's fees as provided by RCW 39.08. The Port shall not be liable for the payment of any costs or expenses of any such suit.

D. No suit or action shall be commenced hereunder by any claimant unless claimant shall have given the written notices to the Port, and where required, the Contractor, in accordance with RCW 39.08.030.

E. The amount of this bond shall be reduced by, and to the extent of, any payment or payments made in good faith hereunder, inclusive of the payment by Surety of claims which may be properly filed in accordance with RCW 39.08 whether or not suit is commenced under and against this bond.

F. If any Claimant shall commence suit and obtain judgment against the Surety for recovery hereunder, then the Surety, in addition to such judgment and attorney fees as provided by RCW 39.08.030, shall also pay such costs and attorney fees as may be incurred by the Port as a result of such suit. Venue for any action arising out of, or in connection with, this bond shall be in Pierce County, Washington.

Signed and Sealed the _____ day of _____, 20____.

IMPORTANT: Surety companies executing bonds must have an A.M. Best Rating of "A-, FSC (6)" or higher, have an underwriting limitation of not less than the Contract Sum, and be authorized to transact business in the State of Washington.

SURETY	**CONTRACTOR**
_____	_____
Signature	Signature
_____	_____
Printed Name and Title	Printed Name and Title

Power of Attorney attached.

END OF SECTION

BOND NO.: _____

PROJECT TITLE: Maintenance Building Back-Up Generator

PROJECT NO.: 101610.01

CONTRACT NO.: 072074

KNOW ALL MEN BY THESE PRESENTS: That we, _____ _____ a corporation existing under and by virtue of the laws of the State of Washington and authorized to do business in the State of Washington, as Principal, and _____, a corporation organized and existing under the laws of the State of _____ and authorized to transact the business of surety in the State of Washington, as Surety, are jointly and severally held and bound unto the PORT OF TACOMA, hereinafter called Port, as Obligee, and are similarly held and bound unto the beneficiaries of the trust fund created by RCW 60.28 as their heirs, executors, administrators, successors, and assigns in the penal sum of _____($_____) plus five (5) percent of any increases in the Contract Price that have occurred or may occur, due to change orders, increases in the quantities, or the addition of any new item of work.

WHEREAS, on the _____ day of _____, the said Principal herein executed Contract No. 072074 with the Port for Maintenance Building Back-Up Generator, Project No. 101610.01.

WHEREAS, said Contract and RCW 60.28 require the Port to withhold from the Principal the sum of five (5) percent from monies earned by the Principal on estimates during the progress of the work, hereinafter referred to as earned retained funds.

WHEREAS, the Principal has requested that the Port accept a bond in lieu of earned retained funds as allowed under RCW 60.28.

NOW THEREFORE, this obligation is such that the Surety, its successors, and assigns are held and bound unto the Port and unto all beneficiaries of the trust fund created by RCW 60.28.011(1) in the aforesaid sum. This bond, including any proceeds therefrom, is subject to all claims and liens and in the same manner and priority as set forth for retained percentages in RCW 60.28. The condition of this obligation is also that if the Principal shall satisfy all payment obligations to persons who may lawfully claim under the trust fund created pursuant to RCW 60.28, to the Port, and indemnify and hold the Port harmless from any and all loss, costs, and damages that the Port may sustain by release of said retainage to Principal, then this obligation shall be null and void, provided the Surety is notified by the Port that the requirements of RCW 60.28.021 have been satisfied and the obligation is duly released by the Port.

IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable under this obligation as Principal. The Surety will not be discharged or released from liability for any act, omission, or defenses of any kind or nature that would not also discharge the Principal.

IT IS HEREBY FURTHER DECLARED AND AGREED that this obligation shall be binding upon and inure to the benefit of the Principal, the Surety, the Port, the beneficiaries of the trust fund created by RCW 60.28 and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, said Principal and said Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20____.

_____

By: _____
Principal

Address: _____

City/ST/Zip: _____

Phone: _____

_____

Surety Name: _____

By: _____
Attorney-In-Fact

Address: _____

City/ST/Zip: _____

Phone: _____

IMPORTANT: Surety companies executing bonds must have an A.M. Best Rating of "A-, FSC (6)" or higher, and be authorized to transact business in the State of Washington.

END OF SECTION

TABLE OF CONTENTS **PAGE**

ARTICLE 1 - THE CONTRACT DOCUMENTS

1.01 GENERAL

A. Contract Documents form the Contract. The Contract Documents are enumerated in the Agreement between the Port and Contractor (“Agreement”). Together, the Contract Documents form the Contract. The Contract represents the entire integrated agreement between the parties and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only in writing and only as set forth in the Contract Documents.

B. Headings only for convenience. The titles or headings of the sections, divisions, parts, articles, paragraphs, and subparagraphs of the Contract Documents are intended only for convenience.

1.02 DEFINITIONS

A. "Contract Documents" proposed for the Work consist of the Agreement, the General Conditions of the Contract (as well as any Supplemental, Special, or other conditions included in the Project Manual), the Drawings, the Specifications, and all Addenda issued prior to, and all modifications issued after, execution of the Contract.

B. “Contractor” means the person or entity contracting to perform the Work under these Contract Documents. The term Contractor includes the Contractor’s authorized representative for purposes of identifying obligations and responsibilities under the Contract Documents, including the ability to receive notice and direction from the Port.

C. "Day" means a calendar day unless otherwise specifically designated.

D. "Drawings” are the graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, including plans, elevations, sections, details, and diagrams.

E. "Engineer” is the Port employee generally tasked with administering the Project on the Port’s behalf and the person with overall responsibility for managing, for the Port, the Project scope, budget, and schedule. To the extent empowered, the Engineer may delegate to others at the Port (such as a Project Manager or Inspector) the responsibility for performing delegated responsibilities of the Engineer’s under this Contract.

F. "Port” means the Port of Tacoma. The Port will designate in writing a representative (usually the Engineer) who shall have the authority to act on the Port’s behalf related to the Project. The “Port” does not include staff, maintenance, or safety workers, or other Port employees or consultants that may contact the Contractor or be present at the Project site.

G. “Project” is identified in the Agreement and is the total construction to be performed by or through the Port, of which the Work performed under the Contract Documents may be only a part.

H. "Specifications” are those portions of the Contract Documents that specify the written requirements for materials, equipment, systems, standards, and workmanship for the Work and for the performance of related services.

I. “Subcontractor” means a person or entity that contracts directly with the Contractor to perform any Work under the Contract Documents. “Subcontractor of any tier” includes Subcontractors as well as any other person or entity, including suppliers, that contracts with a Subcontractor or a lower-tier Subcontractor (also referred to as "Sub-subcontractors") to perform any of the Work.

J. "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, tools, equipment, materials, services, and incidentals necessary to complete all obligations under the Contract Documents. The Work may constitute only a part of the Project, and may interface and need to be coordinated with the work of others.

1.03 INTENT OF THE CONTRACT DOCUMENTS

A. Intent of Contract Documents. The intent of the Contract Documents is to describe the complete Work and to include all items and information necessary for the proper execution and completion of the Work by the Contractor.

B. Contract Documents are complementary. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor is required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

C. No third party contract rights. The Contract Documents shall not create a contractual relationship of any kind (1) between the Port and a Subcontractor of any tier (although the Port does not waive any third-party beneficiary rights it may otherwise have as to Subcontractors of any tier), (2) between the Contractor and the Engineer or other Port employees or consultants, or (3) between any persons or entities other than the Port and Contractor.

1.04 CORRELATION OF THE CONTRACT DOCUMENTS

A. Precedence. In the event of a conflict or discrepancy between or among the Contract Documents, the conflict or discrepancy will be resolved by the following order of precedence: with an addendum or Change Order having precedence over an earlier document, and computed dimensions having precedence over scaled dimensions, and large scale drawings take precedence over small scale drawings:

1. The signed Agreement
    a. Supplemental Conditions
    b. Division 00 General Conditions
    c. Division 01 General Requirements of Specifications
    d. All other Specifications, including all remaining divisions, material and system schedules and attachments, and Drawings
    e. All other sections in Division 00 not specifically identified herein by Section

B. Inconsistency between or among Contract Documents. If there is any inconsistency between the Drawings, schedules, or Specifications, or any attachments, the Contractor will make an inquiry to the Engineer to determine how to proceed, and, unless otherwise directed, the Contractor will provide the better quality or greater quantity of any work or materials, as reasonably interpreted by the Port, at no change in the Contract Sum or Contract Time. Thus, if Work is shown on Drawings, but not contained in Specifications or schedules, or contained in Specifications or schedules, but not shown on the Drawings, the Work as shown or contained will be provided at no change in the Contract Sum or Contract Time, according to Specifications or Drawings to be issued by the Port.

C. Inconsistency with law. In the event of a conflict between the Contract Documents and applicable laws, codes, ordinances, regulations, or orders of governmental authorities having jurisdiction over the Work, or in the event of any conflict between such laws, the most stringent requirements govern.

D. Organization of Contract Documents. The organization of the Specifications and Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of the Work to be performed. The Port assumes no responsibility for the division and proper coordination of Work between particular Subcontractors.

E. Bid quantities are estimates only. Any “bid quantities” set forth in the Contract Documents are estimates only. The Port does not warrant that the actual amount of Work will correspond to any estimates. The basis of payment will be the actual quantities performed in accordance with the Contract Documents.

1.05 OWNERSHIP OF THE CONTRACT DOCUMENTS

A. Port owns all Contract Documents. All Drawings, Specifications, and other Contract Documents furnished to the Contractor are Port property, and the Port retains all intellectual property rights, including copyrights. The Contract Documents are to be used only with respect to the Project.

ARTICLE 2 - PORT OF TACOMA

2.01 AUTHORITY OF THE ENGINEER

A. Engineer will be Port’s representative. The Engineer or the Engineer’s designee will be the Port’s representative during the Project and will administer the Project on the Port’s behalf.

B. Engineer may enforce all obligations. The Engineer has the authority to enforce all requirements imposed on the Contractor by the Contract Documents.

C. Only Engineer is agent of Port. Other than the Engineer, no other Port employee or consultant is an agent of the Port, and none are authorized to agree on behalf of the Port to changes in the Contract Sum or Contract Time, nor to waive provisions of the Contract Documents, nor to direct the Contractor to take actions that change the Contract Sum or Contract Time, nor to accept notice of protests or claims on behalf of the Port.

2.02 ADMINISTRATION OF THE CONTRACT

A. Port will administer Contract. The Port will provide administration of the Contract through the Engineer or the Engineer’s designee. All communications with the Port or its consultants related to the Contract will be through the designated representative.

B. Port not responsible for means and methods. The Port is not responsible for, and will have no control or charge of, the means, methods, techniques, sequences, or procedures of construction, or for safety precautions or programs incidental thereto, because these are the sole responsibility of the Contractor. If the Port makes any suggestion of means, methods, techniques, sequences, or procedures, the Contractor will exercise its independent judgment in deciding whether to adopt the suggestion, except as otherwise provided in the Contract Documents.

C. Port not responsible for acts or omissions of Contractor or Subcontractors. The Port is not responsible for, and will have no control or charge of, the acts or omissions of the Contractor, Subcontractors of any tier, suppliers, or any of their agents or employees, or any other persons performing a portion of the Work.

D. Port not responsible for the Work. The Port is not responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The presence of the Engineer or others at the Project site at any time does not relieve the Contractor from its responsibility for non-conforming Work.

E. Port will have access to the Work. The Port and its representatives will at all times have access to the Work in progress, and the Contractor will provide proper facilities for such access and for inspection.

2.03 INFORMATION PROVIDED BY THE PORT

A. Port to furnish information with reasonable promptness. The Port shall furnish information and services required of the Port by the Contract Documents with reasonable promptness.

B. Subsurface investigation. The Port may have undertaken a limited investigation of the soil and other subsurface conditions at the Project site for design purposes only. The results of these investigations will be available for the convenience of the Contractor, but they are not Contract Documents. There is no warranty or guarantee, express or implied, that the conditions indicated are representative of those existing at the site or that unforeseen developments may not occur. The Contractor is solely responsible for interpreting the information.

2.04 CONTRACTOR REVIEW OF PROJECT INFORMATION

A. Contractor to familiarize itself with site and conditions of Work. Prior to executing the Contract, the Contractor shall visit the site, become generally familiar with local conditions under which the Work is to be performed, and correlate personal observations with the requirements of the Contract Documents and all information provided with the Bid Documents. By signing the Contract, the Contractor confirms that the Contract Sum is reasonable compensation for the Work; that the Contract Time is adequate; that it has carefully examined the Contract Documents and the Project site; and that it has satisfied itself as to the nature, location, and character of the Work, the labor, materials, equipment, and other items required and all other requirements of the Contract Documents. The Contractor's failure fully to acquaint itself with any such condition does not relieve the Contractor from the responsibility for performing the Work in accordance with the Contract Documents, within the Contract Time, and for the Contract Sum.

B. Contractor to review Contract Documents. Because the Contract Documents are complementary, the Contractor will, before starting each portion of the Work, carefully study and compare the various Drawings, Specifications, and other Contract Documents, as well as all information furnished by the Port.

C. Contractor to confirm field conditions. Before starting each portion of the Work, the Contractor shall take field measurements of and verify any existing conditions, including all Work in place, and all general reference points; shall observe any conditions at the site affecting the Contractor; and shall carefully compare field measurements, conditions and other information known to the Contractor with the Contract Documents.

2.05 PORT'S RIGHT TO REJECT, STOP, AND/OR CARRY-OUT THE WORK

A. Port may reject Work. The Port has the authority, but not the obligation, to reject work, materials, and equipment that is defective or that otherwise does not conform to the Contract Documents, and to decide questions concerning the Contract Documents. However, the failure to so reject, or the presence of the Port at the site, shall not be construed as assurance that the Work is acceptable or being completed in compliance with the Contract Documents.

B. Port may stop Work. If the Contractor fails to correct Work that does not comply with the requirements of the Contract Documents, or repeatedly or materially fails to properly carry out the Work, the Port may issue an order to stop all or a portion of the Work until the cause for the order has been eliminated. The Port's right to stop the Work shall not impose a duty on the Port to exercise this right for the benefit of the Contractor or any third party.

C. Port may carry-out Work. If the Contractor fails to perform the Work properly, fails to perform any provision of this Contract, or fails to maintain the Baseline Project Schedule, or if the Port reasonably concludes that the Work will not be completed in the specified manner or within the Contract Time, then the Port may, after three (3) days' written notice to the Contractor and without prejudice to any other remedy the Port may have, perform itself or have performed any or all of the Work and may deduct the cost thereof from any payment then or later due the Contractor.

2.06 SEPARATE CONTRACTORS

A. Port may engage separate contractors or perform work with its own forces. The Port may contract with other contractors ("Separate Contractor") in connection with the Project or perform work with its own forces. The Contractor shall coordinate and cooperate with any Port forces or Separate Contractors, as applicable. The Contractor shall provide reasonable opportunity for the introduction and storage of materials and the execution of work by others.

B. Contractor to inspect work of others. If any part of the Contractor's Work depends on the work of the Port or any Separate Contractor, the Contractor shall inspect and promptly report to the Port, in writing, any defects that impact the Contractor. Failure of the Contractor to so inspect and report defects in writing shall constitute an acceptance by Contractor of the work of the Port or Separate Contractor.

C. Contractor to resolve claims of others. Should the Contractor, or any of its Subcontractors of any tier, cause damage of any kind, including but not limited to delay, to any Separate Contractor, the Contractor shall promptly, and using its best efforts, settle or otherwise resolve the dispute with the Separate Contractor. The Contractor shall also promptly remedy damage caused to completed or partially completed construction.

2.07 OFFICERS AND EMPLOYEES OF THE PORT

A. No personal liability. Officers, employees, and representatives of the Port, including the Commissioners, acting within the scope of their employment, shall not be personally liable to Contractor for any acts or omissions arising out of the Project.

ARTICLE 3 - CONTRACTOR'S RESPONSIBILITIES

3.01 DUTY TO PERFORM THE ENTIRE WORK

A. Contractor must perform entire Work in accordance with Contract Documents. The Contractor shall perform the entire Work required by the Contract in accordance with the Contract Documents. Unless otherwise specifically provided, the Contractor shall provide and pay for all labor, tools, equipment, materials, electricity, power, water, other utilities, transportation, and other facilities necessary for the execution and completion of the Work.

B. Contractor shall be independent contractor. The Contractor shall be, and operate as, an independent contractor in the performance of the Work. The Contractor is not authorized to enter into any agreements or undertakings for, or on behalf of, the Port and is not an agent or employee of the Port.

3.02 OBSERVED ERRORS, INCONSISTENCIES, OMISSIONS, OR VARIANCES IN THE CONTRACT DOCUMENTS

A. Contractor to notify Port of any discrepancy. The Contractor's obligations to review and carefully study the Contract Documents and field conditions are for the purpose of facilitating coordination and construction. If the Contractor at any time observes that the Contract Documents, including Drawings and Specifications, vary from the conditions of the Project site, are in error, or omit any necessary detail, the Contractor shall promptly notify the Engineer in writing through a Request for Information. Any Work done after such observation, until authorized by the Engineer, shall be at Contractor's risk. The Contractor shall also promptly report to the Engineer any observed error, inconsistency, omission, or variance with applicable laws through a Request for Information. If the Contractor fails either to carefully study and compare the Contract Documents, or to promptly report any observed error, inconsistency, omission, or variance, the Contractor shall assume full responsibility and shall bear all costs, liabilities, and damages attributable to the error, inconsistency, omission, or variance.

B. Requests for Information. The Contractor shall submit Requests for Information concerning the Contract Documents by following the procedure and using such form as the Port may require. The Contractor shall minimize Requests for Information by thoroughly studying the Contract Documents and reviewing all Subcontractor requests. The Contractor shall allow adequate time in its planning and scheduling for a response from the Port to a Request for Information.

C. Port may provide information to supplement Drawings and Specifications. Minor items of work or detail that are omitted from the Drawings and Specifications, but inferable from the information presented and normally provided by accepted good practice, shall be provided and/or performed by the Contractor as part of the Contract Sum and within the Contract Time. Similarly, the Engineer may furnish to the Contractor additional Drawings and clarifications, consistent with the Contract Documents, as necessary to detail and illustrate the Work. The Contractor shall conform its Work to such additional Drawings and clarifications at no increase in the Contract Sum or Contract Time.

3.03 SUPERVISION AND RESPONSIBILITY FOR SUBCONTRACTORS

A. Contractor responsible for Work and workers. The Contractor shall have complete control of the means, methods, techniques, sequences, or procedures related to the Work, and for all safety precautions or programs. The Contractor shall have complete control over, and responsibility for, all personnel performing the Work. The Contractor is also responsible for the acts and omissions of the Contractor's principals, employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors of any tier.

B. Contractor to supervise the Work. The Contractor shall continuously supervise and direct the Work using competent and skilled personnel and the Contractor's best skill and attention.

C. Contractor to enforce discipline and good order. The Contractor shall enforce strict discipline and good order among all workers on the Project, and shall not employ any unfit person or anyone not skilled in the work to which they are assigned. Incompetent, careless, or negligent workers shall immediately be removed from the Work. The Port may, but is not obligated to, require the Contractor to remove from the Work, at no change in the Contract Sum or Contract Time, anyone whom the Port considers objectionable.

3.04 MATERIALS AND EQUIPMENT

A. Material and equipment to be new. All materials and equipment to be incorporated into the Work shall be new, unless specifically provided otherwise in the Contract Documents. The Contractor shall, if required in writing by the Port, furnish satisfactory evidence regarding the kind and quality of any materials, identify the source, and warrant compliance with the Contract Documents. The Contractor shall ensure that all materials and equipment are protected, kept dry, and stored under cover in a manner to protect such materials and equipment.

B. Material and equipment shall conform to manufacturer instructions. All materials and equipment shall conform, and shall be applied, installed, used, maintained, and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, or processor, unless otherwise specifically provided by the Engineer.

3.05 CONTRACTOR WARRANTIES

A. Work will be of good quality and performed in workmanlike manner. In addition to any specific warranties set forth in the Contract Documents, the Contractor warrants that the Work, including all materials and equipment furnished under the Contract, will be of good quality and new, will be performed in a skillful and workmanlike manner, and will conform to the requirements of the Contract Documents. Any Work not conforming to this warranty, including unapproved or unauthorized substitutions, shall be considered defective.

B. Work will be free from defects. The Contractor warrants that the Work will be free from defects for a period of one (1) year from the date of Substantial Completion of the Project.

C. Contractor to collect and deliver warranties to Port. The Contractor shall collect and deliver to the Port any written warranties required by the Contract Documents. These warranties shall be obtained and enforced by the Contractor for the benefit of the Port without the necessity of separate assignment. These warranties shall extend to the Port all rights, claims, benefits, and interests that the Contractor may have under express or implied warranties or guarantees against a Subcontractor of any tier, supplier, or manufacturer for defective or non-conforming Work. Warranty provisions that purport to limit or alter the Port's rights under the Contract Documents, or the laws of the State of Washington, are null and void.

D. General requirements. The Contractor is not relieved of its general warranty obligations by the specification of a particular product or procedure in the Contract Documents. Warranties in the Contract Documents shall survive completion, acceptance, and final payment.

3.06 REQUIRED WAGES

A. Contractor will pay required wages. The Contractor shall pay (and shall ensure that all Subcontractors of any tier pay) all prevailing wages and other wages (such as Davis-Bacon Act wages) applicable to the Project. See Specification Section 00 73 46.

B. The Contractor shall defend (at Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold the Port harmless from all liabilities, obligations, claims, demands, damages, disbursements, lawsuits, losses, fines, penalties, costs, and expenses, whether direct or indirect, and including, but not limited to, attorneys' fees and consultants' fees and other costs and expenses of litigation, from any violation or alleged violation by the Contractor or any Subcontractor of any tier of RCW 39.12 ("Prevailing Wages on Public Works") or Chapter 51 RCW ("Industrial Insurance").

3.07 STATE AND LOCAL TAXES

A. Contractor will pay taxes on consumables. The Contractor will pay the retail sales tax on all consumables used during performance of the Work and on all items that are not incorporated into the final Work; this tax shall be included in the Contract Sum.

B. Port will pay taxes on the Contract Sum. The Port will pay state and local retail sales tax on the Contract Sum with each progress payment, and on final payment, for transmittal by the Contractor to the Washington State Department of Revenue or to the applicable local taxing authority. Rule 170: WAC 458-20-170.

C. Direct all tax questions to the Department of Revenue. The Contractor should direct all questions concerning taxes on any portion of the Work to the State of Washington Department of Revenue or to the local taxing authority.

D. State Sales Tax - Rule 171: WAC 458-20-171. For work performed related to building, repairing, or improving streets, roads, etc., which are owned by a municipal corporation, or political subdivision of the state, or by the United States, and which are used, primarily, for foot or vehicular traffic, the Contractor shall include Washington State Retail Sales Taxes in the various schedule prices, or other contract amounts, including those that the Contractor pays on the purchase of materials, equipment, or supplies used or consumed in doing the Work.

1. The bid form will indicate which bid items are subject to Rule 171. Any such identification by the Port is not binding upon the Department of Revenue.

3.08 PERMITS, LICENSES, FEES, AND ROYALTIES

A. Contractor to provide and pay for permits unless otherwise specified. Unless otherwise specified, the Contractor shall procure and pay for all permits, licenses, and governmental inspection fees necessary or incidental to the performance of the Work. All costs related to these permits, licenses, and inspections shall be included in the Contract Sum. Any action taken by the Port to assist the Contractor in obtaining permits or licenses shall not relieve the Contractor of its sole responsibility to obtain and pay for permits, licenses, and inspections as part of the Contract Sum.

B. Contractor’s obligations when permit must be in Port’s name. When applicable law or agency requires a permit to be issued to a public agency, the Port will support the Contractor’s request for the permit and accept the permit in the Port’s name, if:

1. The Contractor takes all necessary steps required for the permit to be issued;

2. The permit applies to Work performed in connection with the Project; and

3. The Contractor agrees in writing to abide by all requirements of the permit and to defend and hold harmless the Port from any liability in connection with the permit.

C. Contractor to pay royalties. The Contractor shall pay all royalties and license fees required for the Work unless otherwise specified in the Contract Documents.

3.09 SAFETY

A. Contractor solely responsible for safety. The Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work and the performance of the Contract.

B. Port not responsible for safety. The Port may identify safety concerns to the Contractor; however, no action or inaction of the Port or any third party relating to safety will: (1) relieve the Contractor of its sole and complete responsibility for safety and sole liability for any consequences, (2) impose any obligation on the Port or a third party to inspect or review the Contractor’s safety program or precautions, (3) impose any continuing obligation on the Port or a third party to ensure the Contractor performs the Work safely, or (4) affect the Contractor’s responsibility for the protection of property, workers, and the general public.

C. Contractor to maintain a safe Work site. The Project site may be occupied during performance of the Work. The safety of these site occupants is of paramount importance to the Port. The Contractor shall maintain the Work site and perform the Work in a safe manner and in accordance with the Washington Industrial Safety and Health Act (WISHA) and all other applicable safety laws, rules, and regulations. This requirement shall apply continuously and not be limited to working hours.

D. Contractor to protect Work site and adjacent property until Final Completion. The Contractor shall continuously protect the Work and adjacent property from damage. At all times until Final Completion, the Contractor shall be responsible for, and protect from damage, weather, deterioration, theft, and vandalism, the Work and all materials, equipment, tools, and other items incorporated or to be incorporated in the Work, and shall repair any damage, injury, or loss.

3.10 CORRECTION OF WORK

A. Contractor to correct defective Work. The Contractor shall, at no cost to the Port, promptly correct Work that is defective or that otherwise fails to conform to the requirements of the Contract Documents. Such Work shall be corrected, whether before or after Substantial Completion, and even if it was previously inspected or observed by the Port.

B. One-year correction period. The Contractor shall correct all defects in the Work appearing within one (1) year of Substantial Completion or within any longer period prescribed by law or by the Contract Documents. The Contractor shall initiate remedial action within fourteen (14) days of receipt of notice from the Port and shall complete remedial work within a reasonable time. Work corrected by the Contractor shall be subject to the provisions of this Section 3.10 for an additional one-year period following the Port's acceptance of the corrected Work.

C. Contractor responsible for defects and failures to correct. The Contractor shall be responsible for any expenses incurred by the Port resulting from defects in the Work. If the Contractor refuses or neglects to correct the defects, or does not timely accomplish corrections, the Port may correct the Work and charge the Contractor the cost of the corrections. If damage or loss of service may result from a delay in correction, the corrections may be made by the Port and reimbursed by the Contractor.

D. Port may accept defective work. The Port may, at its sole option, elect to retain defective or nonconforming Work. In such a case, the Port shall reduce the Contract Sum by a reasonable amount to account for the defect or non-conformance.

E. No period of limitation established. Nothing contained in this Section 3.10 establishes a period of limitation with respect to any obligations under the Contract Documents or law. The establishment of the one (1) year correction period relates only to the specific obligation of the Contractor to correct defective or non-conforming Work.

3.11 UNCOVERING OF WORK

A. Contractor to uncover work covered prior to inspection. If any portion of the Work is covered prior to inspection and approval, the Contractor shall, at its expense, uncover or remove the Work for inspection by the Port or others, and replace the Work to the standard required by the Contract Documents.

B. Contractor to uncover work at Port's request. After initial inspection and observation, the Port may order a reexamination of Work, and the Work must be uncovered by the Contractor. If the uncovered Work complies with the Contract Documents, the Port shall pay the cost of reexamination and replacement. If the Work is found not to comply with the Contract Documents, the Contractor shall pay the cost of replacement, unless the Contractor demonstrates that it did not cause the defect in the Work.

3.12 RELOCATION OF UTILITIES

A. Contractor should assume underground utilities are in approximate locations. The Contractor should assume that the locations of any underground or hidden utilities, underground tanks, and plumbing or electrical runs indicated in surveys or the Contract Documents are shown in approximate locations. The accuracy of this information is not guaranteed by the Port and shall be verified by the Contractor. The Contractor shall comply with RCW 19.122.030 and utilize a utility locator service to locate utilities on Port property. The Contractor shall bear the risk of loss if any of its Work directly or indirectly damages or interrupts any utility service or causes or contributes to damages of any nature.

B. Utility relocation or removal. Where relocation or removal of utilities is necessary or required, it shall be performed at the Contractor's sole expense, unless the Contract Documents specify otherwise. If a utility owner is identified as being responsible for relocating or removing utilities, the work will be accomplished at the utility owner's convenience, either during, or in advance of, construction. Unless otherwise specified, it shall be the Contractor's sole responsibility to coordinate, schedule, and pay for work performed by a utility owner.

C. Contractor to notify Port of unknown utilities. If the Contractor discovers the presence of any unknown utilities, it shall immediately notify the Engineer in writing.

3.13 LABOR

A. Contractor responsible for labor peace. The Contractor is responsible for labor peace relating to the Work and shall cooperate in maintaining Project-wide labor harmony. The Contractor shall use its best efforts as an experienced contractor to adopt and implement policies and practices designed to avoid work stoppages, slowdowns, disputes, or strikes.

B. Contractor to minimize impact of labor disputes. The Contractor will take all necessary steps to prevent labor disputes from disrupting or otherwise interfering with access to Port property. If a labor dispute disrupts the progress of the Work or interferes with access, the Contractor shall promptly and expeditiously take all necessary action to eliminate or minimize the disruption or interference.

3.14 INDEMNIFICATION

A. Duty to defend, indemnify, and hold harmless. To the fullest extent permitted by law and subject to this Section 3.14, the Contractor shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold harmless the Port and the Northwest Seaport Alliance, including their respective Commissions, officers, managers, and employees, the Engineer, any consultants, and the agents and employees, successors and assigns of any of them (the "Indemnified Parties") from and against claims, damages, lawsuits, losses (including loss of use), disbursements, liabilities, obligations, fines, penalties, costs, and expenses, whether direct and indirect or consequential, including but not limited to, consultants' fees, and attorneys' fees incurred on such claims and in proving the right to indemnification ("Claims"), arising out of, or resulting from, the acts or omissions of the Contractor, a Subcontractor of any tier, their agents, and anyone directly or indirectly employed by any of them or anyone for whose acts they may be liable (individually and collectively, the "Indemnitor").

B. Duty to defend, indemnify, and hold harmless for sole negligence. The Contractor will fully defend, indemnify, and hold harmless the Indemnified Parties for the sole negligence or willful misconduct of the Indemnitor.

C. Duty to defend, indemnify, and hold harmless for concurrent negligence. Where Claims arise from the concurrent negligence of (1) the Port; and (2) the Indemnitor, the Contractor's obligations to indemnify and defend the Indemnified Parties under this Section 3.14 shall be effective only to the extent of the Indemnitor's negligence.

D. Duty to indemnify not limited by workers' compensation or similar employee benefit acts. In claims against any of the Indemnified Parties by an employee of the Contractor, a Subcontractor of any tier, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under this Section 3.14 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable under workers' compensation acts, disability benefit acts, or other employee benefit acts. After mutual negotiation of the parties, the Contractor waives immunity as to the Indemnified Parties under Title 51 RCW, "Industrial Insurance."

E. Intellectual property indemnification. The Contractor will be liable for and shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold the Indemnified Parties harmless for Claims for infringement by the Contractor of copyrights or patent rights arising out of, or relating to, the Project.

F. Labor peace indemnification. If the Contractor fails to satisfy its labor peace obligations under the Contract, the Contractor will be liable for and shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold harmless the Indemnified Parties for Claims brought against the Port by third parties (including but not limited to lessees, tenants, contractors, customers, licensees, and invitees of the Port) for injunctive relief or monetary loss.

G. Cyber risk indemnification. Contractor shall defend, indemnify, and hold harmless the Indemnified Parties from and against any liability, expense, fines, penalties, cost, demand, or other obligation, resulting from or out of any cyber-related risk that includes theft, loss or misuse of data, release of private information as result of a network breach, penetration, compromise, or loss of IT systems control.

H. Joinder. The Contractor agrees to being added by the Port as a party to any arbitration or litigation with third parties in which the Port alleges indemnification or seeks contribution from the Indemnitor. The Contractor shall cause each of its Subcontractors of any tier to similarly stipulate in their subcontracts; in the event any does not, the Contractor shall be liable in place of such Subcontractor(s) of any tier.

I. Other. To the extent that any portion of this Section 3.14 is stricken by a court or arbitrator for any reason, all remaining provisions shall retain their vitality and effect. The obligations of the Contractor under this Section 3.14 shall not be construed to negate, abridge, or otherwise reduce any other right or obligations of indemnity which would otherwise exist. To the extent the wording of this Section 3.14 would reduce or eliminate an available insurance coverage, it shall be considered modified to the extent necessary so that the insurance coverage is not affected. This Section 3.14 shall survive completion, acceptance, final payment, and termination of the Contract.

3.15 WAIVER OF CONSEQUENTIAL DAMAGES

A. Mutual waiver of consequential damages. The Contractor and Port waive claims against each other for consequential damages arising out of, or relating to, this Contract. This mutual waiver includes, but is not limited to: (1) damages incurred by the Port for rental expenses, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons, and (2) damages incurred by the Contractor for principal and home office overhead and expenses including, but not limited to, the compensation of personnel stationed there, for losses of financing, business, and reputation, for losses on other projects, for loss of profit, and for interest or financing costs. This mutual waiver includes, but is not limited to, all consequential damages due to either party's termination.

B. Limitation. Nothing contained in this Section 3.15; however, shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents, to preclude damages specified in the Agreement, or to affect the Contractor's obligation to indemnify the Port for direct, indirect, or consequential damages alleged by a third party.

ARTICLE 4 - SUBCONTRACTORS AND SUPPLIERS

4.01 RESPONSIBILITY FOR ACTIONS OF SUBCONTRACTORS AND SUPPLIERS.

A. Contractor responsible for Subcontractors. The Contractor is fully responsible to the Port for the acts and omissions of its Subcontractors of any tier and all persons either directly or indirectly employed by the Contractor or its Subcontractors.

4.02 AWARD OF CONTRACTS TO SUBCONTRACTORS AND SUPPLIERS

A. Contractor to provide proposed Subcontractor information. The Contractor, within ten (10) days after the Port's notice of award of the Contract, shall provide the Engineer with the names of the persons or entities proposed to perform each of the principal portions of the Work (i.e., either a Subcontractor listed in a bid or proposal or a Subcontractor performing Work valued at least ten percent (10%) of the Contract Sum) and the proprietary names, and the suppliers of, the principal items or systems of materials and equipment proposed for the Work. No progress payment will become due until after this information has been furnished.

B. Port to respond promptly with objections. The Port may respond promptly to the Contractor in writing stating: (1) whether the Port has reasonable objection to any proposed person or entity, or (2) whether the Port requires additional time for review. If the Port makes a reasonable objection, the Contractor shall replace the Subcontractor with no increase to the Contract Sum or Contract Time. Such a replacement shall not relieve the Contractor of its responsibility for the performance of the Work and compliance with all of the requirements of the Contract within the Contract Sum and Contract Time.

C. Reasonable objection defined. "Reasonable objection" as used in this Section 4.02 includes, but is not limited to: (1) a proposed Subcontractor of any tier different from the entity listed with the bid, (2) lack of "responsibility" of the proposed Subcontractor, as defined by Washington law and the Bidding Documents, or lack of qualification or responsibility of the proposed Subcontractor based on the Contract or Bidding Documents, or (3) failure of the Subcontractor to perform satisfactorily in the Port's opinion (such as causing a material delay or submitting a claim that the Port considers inappropriate) on one or more projects for the Port within five (5) years of the bid date.

D. No substitution allowed without permission. The Contractor shall not substitute a Subcontractor, person, or organization without the Engineer's written consent.

4.03 SUBCONTRACTOR AND SUPPLIER RELATIONS

A. Contractor to schedule, supervise, and coordinate Subcontractors. The Contractor shall schedule, supervise, and coordinate the operations of all Subcontractors of any tier, including suppliers. The Contractor shall ensure that appropriate Subcontractors coordinate the Work of lower-tier Subcontractors.

B. Subcontractors to be bound to Contract Documents. By appropriate agreement, the Contractor shall require each Subcontractor and supplier to be bound to the terms of the Contract Documents and to assume toward the Contractor, to the extent of their Work, all of the obligations that the Contractor assumes toward the Port under the Contract Documents. Each subcontract shall preserve and protect the rights of the Port and shall allow to the Subcontractor, unless specifically provided in the subcontract, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Port. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with lower-tier Subcontractors.

C. Contractor to correct deficiencies in Subcontractor performance. When a portion of the Work subcontracted by the Contractor is not being prosecuted in accordance with the Contract Documents, or if such subcontracted Work is otherwise being performed in an unsatisfactory manner in the Port's opinion, the Contractor shall, on its own initiative or upon the written request of the Port, take immediate steps to correct the deficiency or remove the non-performing party from the Project. The Contractor shall replace inadequately performing Subcontractors upon request of the Port at no change in the Contract Sum or Contract Time.

D. Contractor to provide subcontracts. Upon request, the Contractor will provide the Port copies of written agreements between the Contractor and any Subcontractor.

ARTICLE 5 - WORKFORCE AND NON-DISCRIMINATION REQUIREMENTS

5.01 COMPLIANCE WITH NON-DISCRIMINATION LAWS

A. Contractor to comply with non-discrimination laws. The Contractor shall fully comply with all applicable laws, regulations, and ordinances pertaining to non-discrimination.

B. Nondiscrimination Provision

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

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

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

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

5.02 MWBE, VETERAN-OWNED, AND SMALL BUSINESS ENTERPRISE PARTICIPATION.

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

   The Port encourages participation in all of its contracts by Veteran-owned businesses (defined in RCW 43.60.010) and located at http://www.dva.wa.gov/program/certified-veteran--and-servicemember-owned-businesses and Small, Mini, and Micro businesses (defined in RCW 39.26.010)

5.03 APPRENTICESHIP PARTICIPATION

A. In accordance with RCW 39.04.320, fifteen (15) percent Apprenticeship Participation is required for all projects estimated to cost one million ($1,000,000) dollars or more.

B. Apprentice participation, under this contract, may be counted towards the required percentage (%) only if the apprentices are from an apprenticeship program registered and approved by the Washington State Apprenticeship and Training Council (RCW 49.04 and WAC 296-05).

C. Bidders may contact the Department of Labor and Industries, Specialty Compliance Services Division, Apprenticeship Section, P.O. Box 44530, Olympia, WA 98504-4530 by phone at (360) 902-5320, or e-mail at Apprentice@lni.wa.gov, to obtain information on available apprenticeship programs.

D. For each project that has apprentice requirements, the contractor shall submit a "Statement of Apprentice and Journeyman Participation" on forms provided by the Port of Tacoma, with every request for project payment. The Contractor shall submit consolidated and cumulative data collected by the Contractor and collected from all subcontractors by the Contractor. The data to be collected and submitted includes the following:

1. Contractor name and address
2. Contract number
3. Project name
4. Contract value
5. Reporting period "Beginning Date" through "End Date"
6. Name and registration number of each apprentice by contractor
7. Total number of apprentices and labor hours worked by them, categorized by trade or craft.
8. Total number of journeymen and labor hours worked by them, categorized by trade or craft
9. Cumulative combined total of apprentice and journeymen labor hours
10. Total percentage of apprentice hours worked

E. No changes to the required percentage (%) of apprentice participation shall be allowed without written approval of the Port. In any request for the change, the Contractor shall clearly demonstrate a good faith effort to comply with the requirements for apprentice participation.

ARTICLE 6 - CONTRACT TIME AND COMPLETION

6.01 CONTRACT TIME

A. Contract Time is measured from Contract execution. Unless otherwise provided in the Agreement, the Contract Time is the period of time, including authorized adjustments, specified in the Contract Documents from the date the Contract is executed to the date Substantial Completion of the Work is achieved.

B. Commencement of the Work. The Contractor shall begin Work in accordance with the notice of award and the notice to proceed and shall complete all Work within the Contract Time. When the Contractor’s signed Agreement, required insurance certificate with endorsements, bonds, and other submittals required by the notice of award have been accepted by the Port, the Port will execute the Contract and, following receipt of other required pre-work submittals, will issue a notice to proceed to allow the Contractor to mobilize and commence physical Work at the Project site, as further described in these contract documents. No Work at the Project site may commence until the Port issues a notice to proceed.

C. Contractor shall achieve specified completion dates. The Contractor shall achieve Substantial Completion within the Contract Time and shall achieve Final Completion within the time period thereafter stated in the Contract Documents.

D. Time is of the essence. Time limits stated in the Contract Documents, including any interim milestones, are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

6.02 PROGRESS AND COMPLETION

A. Contractor to maintain schedule. The Contractor's sequence and method of operations, application of effort, and work force shall at all times be created and implemented to ensure the orderly, expeditious, and timely completion of the Work and performance of the Contract. The Contractor shall furnish sufficient forces and shall work such hours, including extra shifts, overtime operations, and weekend and holiday work as may be necessary to ensure completion of the Work within the Contract Time and the approved Baseline Project Schedule.

B. Contractor to take necessary steps to meet schedule. If the Contractor fails substantially to perform in a timely manner in accordance with the Contract Documents and, through the fault of the Contractor or Subcontractor(s) of any tier, fails to meet the Baseline Project Schedule, the Contractor shall take such steps as may be necessary to immediately improve its progress by increasing the number of workers, shifts, overtime operations, or days of work, or by other means and methods, all without additional cost to the Port. If the Contractor believes that any action or inaction of the Port constitutes acceleration, the Contractor shall immediately notify the Port in writing and shall not accelerate the Work until the Port either directs the acceleration in writing or denies the constructive acceleration.

C. Liquidated damages not exclusive. Any provisions in the Contract Documents for liquidated damages shall not preclude other damages due to breaches of Contract of the Contractor.

6.03 SUBSTANTIAL COMPLETION

A. Substantial Completion defined. Substantial Completion is the stage in the progress of the Work, or portion or phase thereof, when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Port can fully occupy or utilize the Work, or the designated portion thereof, for its intended use, all requirements in the Contract Documents for Substantial Completion have been achieved, and all required documentation has been properly submitted to the Port in accordance with the Contract Documents. All Work, other than incidental corrective or punch list Work and final cleaning, must be completed. The fact that the Port may occupy the Work or a designated portion thereof does not indicate that Substantial Completion has occurred or that the Work is acceptable in whole or in part.

B. Work not Substantially Complete unless Final Completion attainable. The Work is not Substantially Complete unless the Port reasonably judges that the Work can achieve Final Completion within the period of time specified in the Contract Documents.

C. Notice of Substantial Completion. When the Work or designated portion has achieved Substantial Completion, the Port will provide a notice to establish the date of Substantial Completion. The notice shall establish responsibilities of the Port and Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall fix the time within which the Contractor shall finish all remaining Work. If the notice of Substantial Completion does not so state, all responsibility for the foregoing items shall remain with the Contractor until Final Completion.

6.04 COMPLETION OF PUNCH LIST

A. Contractor shall complete punch list items prior to Final Completion. The Contractor shall cause punch list items to be completed prior to Final Completion. If, after Substantial Completion, the Contractor does not expeditiously proceed to correct punch list items or if the Port considers that the punch list items, are unlikely to be completed prior to the date established for Final Completion (or such other period of time as is specified in the Contract Documents), the Port may, upon seven (7) days' written notice to the Contractor, take over and perform some or all of the punch list items. The Port may also take over and complete any portion of the Work at any time following Substantial Completion and deduct the actual cost of performing the Work (including direct and indirect costs) from the Contract Sum. The Port's rights under this Section 6.04 are not obligations and shall not relieve the Contractor of its responsibilities under any other provisions of the Contract Documents.

6.05 FINAL COMPLETION

A. Final Completion. Upon receipt of written notice from the Contractor that all punch list items and other Contract requirements are completed, the Contractor will notify the Port, and the Port will perform a final inspection. If the Port determines that some or all of the punch list items have not been addressed, the Contractor shall be responsible to the Port for all costs, including re-inspection fees, for any subsequent reviews to determine completion of the punch list. When the Port determines that all punch list items have been satisfactorily addressed, that the Work is acceptable under the Contract Documents, and that the Work has fully been performed, the Port will promptly notify the Contractor of Final Completion.

B. Contractor responsible for costs if Final Completion is not timely achieved. In addition to any liquidated damages, the Contractor is liable for, and the Port may deduct from any amounts due the Contractor, all costs incurred by the Port for services performed after the contractual date of Final Completion, whether or not those services would have been performed prior to that date had Final Completion been timely achieved.

C. Final Completion submittals. The Port is not obligated to accept the Project as complete until the Contractor has submitted all required submittals to the Port.

D. Contractor responsible for the Work until Final Completion. The Contractor shall assume the sole risk of loss and responsibility for all Work under the Contract, and all materials to be incorporated in the Work, whether in storage or at the Project site, until Final Completion. Damage from any cause to either permanent or temporary Work, utilities, materials, equipment, existing structures, the site, or other property owned by the Port or others, shall be repaired by the Contractor to the reasonable satisfaction of the Port at no change in the Contract Sum.

6.06 FINAL ACCEPTANCE

A. Final Acceptance. Final Acceptance is the formal action of the Port accepting the Project as complete. Public notification of Final Acceptance will be posted on the Port's external website (http://www.portoftacoma.com/final-acceptance).

B. Final Acceptance not an acceptance of defective Work. Final Acceptance shall not constitute acceptance by the Port of unauthorized or defective Work, and the Port shall not be prevented from requiring the Contractor to remove, replace, repair, or dispose of unauthorized or defective Work or recovering damages due to the same.

C. Completion of Work under RCW 60.28. Pursuant to RCW 60.28, "Lien for Labor, Materials, Taxes on Public Works," completion of the Contract Work shall occur upon Final Acceptance.

6.07 PORT'S RIGHT TO USE THE PREMISES

A. Port has right to use and occupy Work. The Port reserves the right to occupy or use any part of the Work before or after Substantial Completion of some or all of the Work without relieving the Contractor of any of its obligations under the Contract. Such occupancy or use shall not constitute acceptance by the Port of any of the Work, and shall not cause any insurance to be canceled or lapse.

B. No compensation due if Port elects to use and occupy Work. No additional compensation shall be due to the Contractor as a result of the Port's use or occupancy of the Work or a designated portion.

ARTICLE 7 - PAYMENT

7.01 ALL PAYMENTS SUBJECT TO APPLICABLE LAWS AND SCHEDULE OF VALUES

A. Payment of the Contract Sum. The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Port to the Contractor for performance of the Work under the Contract Documents. Payments made to the Contractor are subject to all laws applicable to the Port and the Contractor. Payment of the Contract Sum constitutes full compensation to the Contractor for performance of the Work, including all risk, loss, damages, or expense of whatever character arising out of the nature or prosecution of the Work. The Port is not obligated to pay for extra work or materials furnished without prior written approval of the Port.

B. Schedule of Values. All payments will be based upon an approved Schedule of Values. Prior to submitting its first Application for Payment, the Contractor shall submit a Schedule of Values to the Port allocating the entire Contract Sum to the various portions of the Work. The Schedule of Values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Port may require. This schedule, unless objected to by the Port, shall be used as a basis for reviewing the Contractor's applications for payment.

7.02 APPLICATIONS FOR PAYMENT

A. Applications for Payment. Progress payments will be made monthly for Work duly certified, approved by the Engineer, and performed (based on the Schedule of Values and actual quantities of Work performed) during the calendar month preceding the Application for Payment. These amounts are paid in trust to the Contractor for distribution to Subcontractors to the extent, and in accordance with, the approved Application for Payment.

7.03 PROGRESS PAYMENTS

A. Progress payments. Following receipt of a complete Application for Payment, the Engineer will either authorize payment or indicate in writing to the Contractor the specific reasons why the payment request is being denied, in whole or in part, and the remedial action the Contractor must take to receive the withheld amount. After a complete Application for Payment has been received and approved by the Port, payment will be made within thirty (30) days. Any payments made by, or through, or following receipt of, payment from third parties will be made in accordance with the third party's policies and procedures.

B. Port may withhold payment. The Port may withhold payment in whole or in part as provided in the Contract Documents or to the extent reasonably necessary to protect the Port from loss or potential loss for which the Contractor is responsible, including loss resulting from the Contractor's acts and omissions.

7.04 PAYMENT BY CONTRACTOR TO SUBCONTRACTORS

A. Payment to Subcontractors. With each Application for Payment, the Contractor shall provide a list of Subcontractors to be paid by the Contractor. No payment request shall include amounts the Contractor does not intend to pay to a Subcontractor because of a dispute or other reason. If, however, after submitting an Application for Payment, but before paying a Subcontractor, the Contractor discovers that part or all of a payment otherwise due to the Subcontractor is subject to withholding from the Subcontractor under the subcontract (such as for unsatisfactory performance or non-payment of lower-tier Subcontractors), the Contractor may withhold the amount as allowed under the subcontract, but it shall give the Subcontractor and the Port written notice of the remedial actions that must be taken and pay the Subcontractor within eight (8) working days after the Subcontractor satisfactorily completes the remedial action identified in the notice.

B. Payment certification to be provided upon request. The Contractor shall provide, with each Application for Payment, a certification signed by Contractor attesting that all payments by the Contractor to Subcontractors from the last Application for Payment were made within ten (10) days of the Contractor's receipt of payment. The certification will also attest that the Contractor will make payment to Subcontractors for the current Application for Payment within ten (10) days of receipt of payment from the Port.

7.05 FINAL PAYMENT

A. Final payment. Final applications for payment are due within seven (7) days following Final Completion. Final payment of the unpaid balance of the Contract Sum, except retainage, will be made following Final Completion and within thirty (30) days of the Contractor's submission of an approved final Application for Payment.

B. Releases required for final payment. The final payment shall not become due until the Contractor delivers to the Port a complete release of all liens arising out of the Contract, as well as an affidavit stating that, to the best of Contractor's knowledge, its release includes all labor and materials for which a lien could be filed. If a Subcontractor of any tier refuses to furnish a release or waiver required by the Port, the Port may (a) retain in the fund, account, or escrow funds in such amount as to defray the cost of foreclosing the liens of such claims and to pay attorneys' fees, the total of which shall be no less than 150% of the claimed amount, or (b) accept a bond from the Contractor, satisfactory to the Port, to indemnify the Port against the lien. If any such lien remains unsatisfied after all payments from the retainage are made, the Contractor shall refund to the Port all moneys that the Port may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

C. Contractor to hold Port harmless from liens. The Contractor shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold harmless the Port from any liens, claims, demands, lawsuits, losses, damages, disbursements, liabilities, obligations, fines, penalties, costs, and expenses, whether direct or indirect, including but not limited to, attorneys' fees and consultants' fees and other costs and expenses, except to the extent a lien has been filed because of the failure of the Port to make a contractually required payment.

7.06 RETAINAGE

A. Retainage to be withheld. In accordance with RCW 60.28, a sum equal to five percent (5%) of each approved Application for Payment shall be retained. Prior to submitting its first Application for Payment, the Contractor shall exercise one of the options listed below:

1. Retained percentages will be retained by the Port in a fund; or

2. Deposited by the Port in an interest-bearing account or escrow account in a bank, mutual savings bank, or savings and loan association designated by the Contractor, not subject to withdrawal until after the final acceptance of said improvement or work as completed, or until agreed to by both parties; provided that interest on such account shall be paid to the Contractor. Contractor to complete and submit Port provided Retainage Escrow Agreement (Section 00 61 23.13); or

3. If the Contractor provides a bond in place of retainage, it shall be in an amount equal to 5% of the Contract Sum plus Change Orders. The retainage bond shall be based on the form furnished in Section 00 61 23 or otherwise acceptable to the Port and duly completed and signed by a licensed surety or sureties registered with the Washington State Insurance Commissioner and on the currently authorized insurance list published by the Washington State Insurance Commissioner. The surety or sureties must be rated at least "A-, FSC(6)" or higher by A.M. Best Rating Guide and be authorized by the Federal Department of the Treasury. Attorneys-in-fact who sign the retainage bond must file with each bond a certified and effective Power of Attorney statement.

B. Contractor may withhold retainage from Subcontractors. The Contractor or a Subcontractor may withhold not more than five percent (5%) retainage from the monies earned by any Subcontractor or lower-tier Subcontractor, provided that the Contractor pays interest to the Subcontractor at the same interest rate it receives from its reserved funds. If requested by the Port, the Contractor shall specify the amount of retainage and interest due a Subcontractor.

C. Release of retainage. Retainage will be withheld and applied by the Port in a manner required by RCW 60.28 and released in accordance with the Contract Documents and statutory requirements. Release of the retainage will be processed in the ordinary course of business within sixty (60) days following Final Acceptance of the Work by the Port provided that no notice of lien has been given as provided in RCW 60.28, that no claims have been brought to the attention of the Port, that the Port has no claims under this Contract, and that release of retention has been duly authorized by the State. The following items must also be obtained prior to release of retainage: pursuant to RCW 60.28, a certificate from the Department of Revenue; pursuant to RCW 50.24, a certificate from the Department of Employment Security; and appropriate information from the Department of Labor and Industries including approved affidavits of wages paid for the Contractor and each subcontractor.

7.07 DISPUTED AMOUNTS

A. Disputed amounts. If the Contractor believes it is entitled to payment for Work performed during the prior calendar month in addition to the agreed-upon amount, the Contractor may submit to the Port, along with the approved Application for Payment, a separate written payment request specifying the exact additional amount claimed to be due, the category in the Schedule of Values to which the payment would apply, the specific Work for which additional payment is sought, and an explanation of why the Contractor believes additional payment is due.

7.08 EFFECT OF PAYMENT

A. Payment does not relieve Contractor of obligations. Payment to the Contractor of progress payments or final payment does not relieve the Contractor from its responsibility for the Work or its responsibility to repair, replace, or otherwise make good defective Work, materials, or equipment. Likewise, the making of a payment does not constitute a waiver of the Port's right to reject defective or non-conforming Work, materials, or equipment (even though they are covered by the payment), nor is it a waiver of any other rights of the Port.

B. Acceptance of final payment waives claims. Acceptance of final payment by the Contractor, a Subcontractor of any tier, or a supplier shall constitute a waiver of claims except those previously made in writing and identified as unsettled in Contractor's final Application for Payment.

C. Execution of Change Order waives claims. The execution of a Change Order shall constitute a waiver of claims by the Contractor arising out of the Work to be performed or deleted pursuant to the Change Order, except as specifically described in the Change Order.

7.09 LIENS

A. Contractor to discharge liens. The Contractor shall promptly pay (and secure the discharge of any liens asserted by) all persons properly furnishing labor, equipment, materials, or other items in connection with the performance of the Work including, but not limited to, any Subcontractors of any tier.

ARTICLE 8 - CHANGES IN THE WORK

8.01 CHANGES IN THE WORK

A. Changes in the Work authorized. Without invalidating the Contract and without notice to the Contractor's surety, the Port may authorize changes in the Work after execution of the Contract, including changes in the Contract Sum or Contract Time. Changes shall occur solely by Change Order, Unilateral Change Directive, or Minor Change in Work. All changes in the Work are effective immediately, and the Contractor shall proceed promptly to perform the change, unless otherwise provided in the Change Order or Directive.

B. Changes in the Work Defined.

1. A Change Order is a written instrument signed by the Port and Contractor stating their agreement to a change in the Work and the adjustment, if any, in the Contract Sum and/or Contract Time.

2. A Unilateral Change Directive is a written instrument issued by the Port to transmit new or revised Drawings, issue additions or modifications to the Contract, furnish other direction and documents adjustment, if any, to the Contract Sum and/or Contract Time. A Unilateral Change Directive is signed only by the Port, without requiring the consent or signature of the Contractor.

3. A Minor Change in the Work is a written order from the Port directing a change that does not involve an adjustment to the Contract Sum or the Contract Time.

C. Request for Proposal: At any time, the Port may issue a Proposal Request directing the Contractor to propose a change to the Contract Sum and/or Contract Time, if any, based on a proposed change in the Work. The Contractor shall submit a responsive Change Order proposal as soon as possible, and no later than fourteen (14) days after receipt, in which the Contractor specifies in good faith the extent to which the Contract Sum and/or Contract Time would change. All cost components shall be limited to the manner described in Section 8.02(B). If the Contractor fails to timely respond to a Proposal Request, the Port may issue the change as a Unilateral Change Directive.

1. Fixed price method is default for Contractor Change Order proposal. When the Port has requested that the Contractor submit a Change Order proposal, the Port may specify the basis on which the Contract Sum will be adjusted by the Contractor. The Engineer's preference, unless otherwise indicated, is for changes in the Work to be priced using Lump Sums or Unit Prices or on a time and material (Force Account) basis if unit pricing or lump sums cannot be negotiated or determined. In all instances, however, proposed changes shall include a not-to-exceed price for the change and shall be itemized for evaluation purposes in accordance with Section 8.02(B), as requested by the Engineer.
2. The Port may accept or reject the Contractor's Change Order proposal, request further documentation, or negotiate acceptable terms with the Contractor. If The Port and Contractor reach agreement on the terms of any change in the Work, including any adjustment in the Contract Sum or Contract Time, such agreement shall be incorporated in a Change Order.
3. The Change Order shall constitute full payment and final settlement of all claims for time and for direct, indirect, and consequential costs, including costs of delays, inconvenience, disruption of schedule, or loss of efficiency or productivity, related to any Work either covered or affected by the Change Order, or related to the events giving rise to the request for equitable adjustment. The Port may reject a proposal, in which case the Port may either not effectuate the change or issue a Unilateral Change Directive. The Port will not make payment to the Contractor for any work until that work has been incorporated into an executed Change Order.

D. Unforeseen Conditions: If the Contractor encounters conditions at the site that are: (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or any soils reports made available by the Port to the Contractor, or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall immediately provide oral notice to the Engineer before conditions are disturbed, followed within 24 hours by an initial written notice. The Contractor shall submit a detailed proposal no later than seven (7) days following discovery of differing site conditions. The Engineer will promptly investigate these conditions and, if the Engineer determines that they differ materially and cause an increase or decrease in the Contractor's cost or time required for performance of any part of the Work, will establish a change in the Contract Sum or Contract Time, or both, consistent with the requirements of the Contract Documents. If the Contractor disputes the Engineer's determination, the Contractor may proceed as provided in the dispute resolution procedure (Article 11). No increase to the Contract Sum or the Contract Time shall be allowed if the Contractor does not comply with the contractual requirements or if the Contractor knew, or reasonably should have known, of the concealed conditions prior to executing the Contract.

E. Proceed Immediately: Pending agreement on the terms of the Change Order or upon determination of a differing site condition as defined in 8.01(D), the Engineer may direct Contractor to proceed immediately with the change in the Work. Contractor shall not proceed with any change in the Work until it has obtained the Engineer's written approval and documentation of the following:

1. The scope of work
2. An agreed upon maximum not-to-exceed amount
3. The method of final cost determination

4. Estimated time to complete the changed work

5. As a change in the Work is performed, unless the parties have signed a written Change Order to establish the cost of the change, the Contractor shall maintain an itemized accounting of all costs related to the change based on the categories in Section 8.02(B) and provide such data to the Port upon request. This includes, without limitation, invoices, including freight and express bills, and other support for all material, equipment, Subcontractor, and other charges related to the change and, for material furnished from the Contractor's own inventory, a sworn affidavit certifying the actual cost of such material. Failure to provide data to the Port within seven (7) days of a request constitutes a waiver of any claim. The Port may furnish any material or equipment to the Contractor that it deems advisable, and the Contractor shall have no claim for any costs or fee on such material or equipment.

F. Procedure for Unilateral Change Directive. Whether or not the Port has rejected a Contractor's proposal, the Port may issue a Unilateral Change Directive and the Contractor shall promptly proceed with the specified Work. If the Contractor disagrees with a Unilateral Change Directive, the Contractor shall advise the Port in writing through a Change Order proposal within seven (7) days of receipt. The Contractor's Change Order proposal shall reasonably specify the reasons for any disagreement and the adjustment it proposes. Without this timely Change Order proposal, the Contractor shall conclusively be deemed to have accepted the Port's proposal.

G. Payment pending final determination of Force Account work. Pending final determination of the total cost of Force Account Work, and provided that the Work to be performed under Force Account is complete and any reservations of rights have been signed by the Port, the Contractor may request payment for amounts not in dispute in the next Application for Payment accompanied by documentation indicating the parties' agreement. Work done on a Force Account basis must be approved in writing on a daily basis by the Engineer or the Engineer's designee and invoices shall be submitted with an Application for Payment within sixty (60) days of performance of the Work.

8.02 CHANGES IN THE CONTRACT SUM

A. Port to Decide How Changes are Measured. The Port may elect, in its sole discretion, how changes in the Work will be measured for payment. Change in the Work may be priced on a lump sum basis, through Unit Prices, as Force Account, or by another method documented in the executed Change Order, Unilateral Change Directive, or Minor Change in the Work.

B. Determination of Cost of Change. The total cost of any change in the Work, including a claim under Article 11, shall not exceed the prevailing cost for the Work in the locality of the Project. In all circumstances, the change in the Work shall be limited to the reasonable, actual cost of the following components:

1. Direct labor costs: These are the actual labor costs determined by the number of additional craft hours at their normal hourly rate necessary to perform a change in the Work. The hourly cost of labor will be based upon the following:

a. Basic wages and fringe benefits: The hourly wage (without markup or labor burden) and fringe benefits paid by the Contractor as established by the Washington Department of Labor and Industries or contributed to labor trust funds as itemized fringe benefits, whichever is applicable, not to exceed that specified in the applicable "Intent to Pay Prevailing Wage," for the laborers, apprentices, journeymen, and foremen performing or directly supervising the change in the Work on site. These wages do not include the cost of Contractor's project manager or superintendent or above, and the premium portion of overtime wages is not included unless pre-approved in writing by the Port. Costs paid or incurred by the Contractor for vacations, per diem, subsistence, housing, travel, bonuses, stock options, or discretionary payments to employees are not separately reimbursable. The Contractor shall provide to the Port copies of payroll records, including certified payroll statements for itself and Subcontractors of any tier, upon the Port's request.

b. Workers' insurance: Direct contributions to the State of Washington as industrial insurance; medical aid; and supplemental pension by class and rates established by the Washington Department of Labor and Industries.

c. Federal insurance: Direct contributions required by the Federal Insurance Compensation Act (FICA); Federal Unemployment Tax Act (FUTA); and State Unemployment Compensation Act (SUCA).

2. Direct material costs: This is an itemization, including material invoices, of the quantity and actual cost of additional materials necessary to perform the change in the Work. The cost will be the net cost after all discounts or rebates, freight costs, express charges, or special delivery costs, when applicable. No lump sum costs will be allowed unless approved in advance by the Port.

3. Construction equipment usage costs: This is an itemization of the actual length of time that construction equipment necessary and appropriate for the Work is used solely on the changed Work times the applicable rental cost as established by the lower of the local prevailing rates published in www.equipmentwatch.com, as modified by the AGC/WSDOT agreement, or the actual rate paid to an unrelated third party. If more than one rate is applicable, the lowest available rate will be utilized. Rates and quantities of equipment rented that exceed the local fair market rental costs shall be subject to the Port's prior written approval. Total rental charges for equipment or tools shall not exceed 75% of the fair market purchase value of the equipment or the tool. Actual, reasonable mobilization costs are permitted if the equipment is brought to the site solely for the change in the Work. Mobilization and standby costs shall not be charged for equipment already present on the site.

   The rates in effect at the time of the performance of the changed Work are the maximum rates allowable for equipment of modern design, and in good working condition, and include full compensation for furnishing all fuel, oil, lubrication, repairs, maintenance, and insurance. No gas surcharges are payable. Equipment not of modern design and/or not in good working condition will have lower rates. Hourly, weekly, and/or monthly rates, as appropriate, will be applied to yield the lowest total cost.

4. Subcontractor costs: These are payments the Contractor makes to Subcontractors for changed Work performed by Subcontractors. The Subcontractors' cost of changed Work shall be determined in the same manner as prescribed in this Section 8.02 and, among other things, shall not include consultant costs, attorneys' fees, or claim preparation expenses.

5. Service provider costs: These are payments the Contractor makes to service providers for changed Work performed by service providers. The service providers' cost of changed Work shall be determined in the same manner as prescribed in this Section 8.02.

6. Markup: This is the maximum total amount for overhead, profit, and other costs, including office, home office and site overhead (including purchasing, project manager, superintendent, project engineer, estimator, and their vehicles and clerical assistants), taxes (except for sales tax on the Contract Sum), warranty, safety costs, printing and copying, layout and control, quality control/assurance, small or hand tools (a tool that costs $500 or less and is normally furnished by the performing contractor), preparation of as-built drawings, impact on unchanged Work, Change Order and/or claim preparation, and delay and impact costs of any kind (cumulative, ripple, or otherwise), added to the total cost to the Port of any Change Order work. No markup shall be due, however, for direct settlements of Subcontractor claims by the Port after Substantial Completion. The markup shall be limited in all cases to the following schedule:

    a. Direct labor costs -- 20% markup on the direct cost of labor for the party (Contractor or Subcontractor) providing labor related to the change in the Work;

    b. Direct material costs -- 20% markup on the direct cost of material for the party (Contractor or Subcontractor) providing material related to the change in the Work;

    c. Construction equipment usage costs -- 10% markup on the direct cost of equipment for the party (Contractor or Subcontractor) providing equipment related to the change in the Work;

    d. Contractor markup on Subcontractor costs -- 10% markup for the Contractor on the direct cost (excluding markup) of a change in the Work performed by Subcontractors (and for Subcontractors, for a change in the Work performed by lower-tier Subcontractors); and

    e. Service provider costs -- 5% markup for the Contractor on the direct cost (excluding markup) of a change in the Work performed by service providers.

    The total summed markup of the Contractor and all Subcontractors of any tier shall not exceed 30% of the direct costs of the change in the Work. If the markup would otherwise exceed 30%, the Contractor shall proportionately reduce the markup for the Contractor and all Subcontractors of any tier.

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

    a. Contractor's liability insurance: The actual cost (expressed as a percentage submitted with the certificate of insurance provided under the Contract Documents and subject to audit) of the Contractor's liability insurance arising directly from the changed Work; and

    b. Public works bond: The actual cost (expressed as a percentage submitted under the Contract Documents and subject to audit) of the Contractor's performance and payment bond arising directly from the changed Work.

    Upon request, the Contractor shall provide the Port with supporting documentation from its insurer or surety of any associated cost incurred. The cost of the insurance or bond premium together shall not exceed 2.0% of the cost of the changed Work.

8. Unit Prices. If Unit Prices are specified in the Contract Documents or established by agreement of the parties for certain Work, the Port may apply them to the changed Work. Unit Prices shall include pre-agreed rates for material quantities and shall include reimbursement for all direct and indirect costs of the Work, including overhead, profit, bond, and insurance costs arising out of, or related to, the Unit Priced item. Quantities must be supported by field measurement statements signed by the Port, and the Port shall have access as necessary for quantity measurement. The Port shall not be responsible for not-to-exceed limit(s) without its prior written approval.

8.03 CHANGES IN THE CONTRACT TIME

A. Extension of the Contract Time. If the Contractor is delayed at any time in the commencement or progress of the Work by events for which the Port is responsible, by unanticipated abnormal weather (subject to Section 8.03(E) below), or by other causes not the fault or responsibility of the Contractor that the Port determines may justify a delay in the Contract Time, then the Contract Time shall be extended by Change Order for such reasonable time as the Port may determine. In no event, however, shall the Contractor be entitled to any extension of time absent proof of: (1) delay to an activity on the critical path of the Project, or (2) delay transforming an activity to the critical path, so as to actually delay the anticipated date of Substantial Completion.

B. Allocation of responsibility for delay not caused by Port or Contractor. If a delay was not caused by the Port, the Contractor, or anyone acting on behalf of any of them, the Contractor is entitled only to an increase in the Contract Time but not an increase in the Contract Sum.

C. Allocation of responsibility for delay caused by Port. If a delay was caused by the Port or someone acting on behalf of the Port and affected the critical path, the Contractor shall be entitled to a change in the Contract Time and Contract Sum in accordance with Section 8.02. The Contractor shall not recover damages, an equitable adjustment, or an increase in the Contract Sum or Contract Time from the Port; however, where the Contractor could reasonably have avoided the delay. The Port is not obligated directly or indirectly for damages for any delay suffered by a Subcontractor of any tier that does not increase the Contract Time.

D. Allocation of responsibility for delay caused by Contractor. If a delay was caused by the Contractor, a Subcontractor of any tier, or anyone acting on behalf of any of them, the Contractor is not entitled to an increase in the Contract Time or in the Contract Sum.

E. Adverse weather. If adverse weather is identified as the basis for a claim for additional time, the claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not reasonably have been anticipated and had an adverse effect on the critical path of construction, and that the Work was on schedule (or not behind schedule through the fault of the Contractor) at the time the adverse weather conditions occurred. Neither the Contract Time nor the Contract Sum will be adjusted for normal inclement weather. For a claim based on adverse weather, the Contractor shall be eligible only for a change in the Contract Time (but not a change in the Contract Sum) if the Contractor can substantiate that there was significantly greater than normal inclement weather considering the full term of the Contract Time.

F. Damages for delay. In the event the Contractor (including any Subcontractors of any tier) is held to be entitled to damages from the Port for delay beyond the amount permitted in Section 8.02(B), the total combined damages to the Contractor and any Subcontractors of any tier for each day of delay shall be limited to the reasonable, actual costs of the delay for which the Port is wholly responsible. The limitation on damages set forth in this Section does not apply to any damages arising exclusively from delay to which the Contractor is entitled to recover under Section 8.03(F).

G. Limitation on damages. The Contractor shall not be entitled to damages arising out of loss of efficiency; morale, fatigue, attitude, or labor rhythm; constructive acceleration; home office overhead; expectant under run; trade stacking; reassignment of workers; rescheduling of Work, concurrent operations; dilution of supervision; learning curve; beneficial or joint occupancy; logistics; ripple; season change; extended or increased overhead or general conditions; profit upon damages for delay; impact damages including cumulative impacts; or similar damages. Any effect that such alleged costs may have upon the Contractor or its Subcontractors of any tier is fully compensated through the markup on Change Orders paid through Section 8.02(B).

8.04 RESERVATION OF RIGHTS

A. Reservations of rights void unless signed by Port. Reservations of rights will be deemed waived and are void unless any reserved rights are described in detail and are signed by the Contractor and the Port.

B. Procedure for unsigned reservations of rights. If the Contractor adds a reservation of rights not signed by the Port to any Change Order, Unilateral Change Directive, Change Order proposal, Application for Payment, or any other document, all amounts and all Work therein shall be considered disputed and not payable until costs are re-negotiated or the reservation is withdrawn or changed in a manner satisfactory to, and signed by, the Port. If the Port makes payment based on a document that contains a reservation of rights not signed by the Port, and if the Contractor cashes such payment, then the reservation of rights shall be deemed waived, withdrawn, and of no effect.

8.05 UNIT PRICES

A. Adjustment to Unit Prices. If Unit Prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed (less than eighty percent (80%) or more than one hundred and twenty percent (120%) of the quantity estimated) so that application of a Unit Price would be substantially unfair, the applicable Unit Price but not the Contract Time, shall be adjusted if the Port prospectively approves a Change Order revising the Unit Price.

B. Procedure to change Unit Prices. The Contractor or Port may request a Change Order revising a Unit Price by submitting information to support the change. A proposed change to a Unit Price will be evaluated by the Port based on the change in cost resulting solely from the change in quantity, any change in production rate or method as compared to the original plan, and the share, if any, of fixed expenses properly chargeable to the item. If the Port and Contractor agree on the change, a Change Order will be executed. If the parties cannot agree, the Contractor shall comply with the dispute resolution procedures (Article 11).

ARTICLE 9 - SUSPENSION AND TERMINATION OF CONTRACT

9.01 PORT'S RIGHT TO SUSPEND WORK

A. Port may suspend the Work. The Port may at any time suspend the Work, or any part thereof, by giving notice to the Contractor. The Work shall be resumed by the Contractor as soon as possible, but no later than fourteen (14) days after the date fixed in a notice to resume the Work. The Port shall reimburse the Contractor for appropriate and reasonable expenses consistent with Section 8.02 incurred by the Contractor as a result of the suspension, except where a suspension is the result of the Contractor repeatedly or materially failing to carry out or correct the Work in accordance with the Contract Documents, and the Contractor shall take all necessary steps to minimize expenses.

B. Contractor obligations. During any suspension of Work, the Contractor shall take every precaution to prevent damage to, or deterioration of, the Work. The Contractor shall be responsible for all damage or deterioration to the Work during the period of suspension and shall, at its sole expense, correct or restore the Work to a condition acceptable to the Port prior to resuming Work.

9.02 TERMINATION OF CONTRACT FOR CAUSE BY THE PORT

A. Port may terminate for cause. If the Contractor is adjudged bankrupt or makes a general assignment for the benefit of the Contractor's creditors, if a receiver is appointed due to the Contractor's insolvency, or if the Contractor, in the opinion of the Port, persistently or materially refuses or fails to supply enough properly skilled workmen or materials for proper completion of the Contract, fails to make prompt payment to Subcontractors or suppliers for material or labor, disregards laws, ordinances, or the instructions of the Port, fails to prosecute the Work continuously with promptness and diligence, or otherwise materially violates any provision of the Contract, then the Port, without prejudice to any other right or remedy, may terminate the Contractor after giving the Contractor seven (7) days' written notice (during which period the Contractor shall have the right to cure).

B. Procedure following termination for cause. Following a termination for cause, the Port may take possession of the Project site and all materials and equipment, and utilize such materials and equipment to finish the Work. The Port may also exclude the Contractor from the Project site(s). If the Port elects to complete all or a portion of the Work, it may do so as it sees fit. The Port shall not be required to accept the lowest bid for completion of the Work and may choose to complete all or a portion of the Work using its own work force. If the Port elects to complete all or a portion of the Work, the Contractor shall not be entitled to any further payment until the Work is finished. If the expense of finishing the Work, including compensation for additional managerial and administrative services of the Port, exceeds the unpaid balance of the Contract Sum, the excess shall be paid by the Contractor.

C. Port's remedies following termination for cause. The Port may exercise any rights, claims, or demands that the Contractor may have against third persons in connection with the Contract, and for this purpose the Contractor assigns and transfers to the Port all such rights, claims, and demands.

D. Inadequate termination for cause converted to termination for convenience. If, after the Contractor has been terminated for cause, it is determined that inadequate "cause" for such termination exists, then the termination shall be considered a termination for convenience pursuant to Section 9.03.

9.03 TERMINATION OF CONTRACT FOR CONVENIENCE BY THE PORT

A. Port may terminate for convenience. The Port may, at any time (without prejudice to any right or remedy of the Port), terminate all, or any portion of, the Contract for the Port's convenience and without cause. The Contractor shall be entitled to receive payment consistent with the Contract Documents only for Work properly executed through the date of termination, and costs necessarily incurred by reason of the termination (such as the cost of settling and paying claims arising out of the termination under subcontracts or orders), along with a fee of one percent (1%) of the Contract Sum not yet earned on the whole or part of the Work. The total amount to be paid to the Contractor shall not exceed the Contract Sum as reduced by the amount of payments otherwise made. The Port shall have title to all Work performed through the date of termination.

9.04 TERMINATION OF CONTRACT BY THE CONTRACTOR

A. Contractor may terminate for cause. The Contractor may terminate the Contract if the Work is stopped for a period of sixty (60) consecutive days through no act or fault of the Contractor or a Subcontractor of any tier, for either of the following reasons:

1. Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped; or

2. An act of government, such as a declaration of national emergency, that requires all Work to be stopped.

B. Procedure for Contractor termination. If one of the reasons described in Section 9.04A exists, the Contractor may, upon seven (7) days' written notice to the Port (during which period the Port has the opportunity to cure), terminate the Contract and recover from the Port payment for Work executed through the date of termination in accordance with the Contract Documents and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead and profit on Work executed and direct costs incurred by reason of such termination. The total recovery of the Contractor shall not exceed the unpaid balance of the Contract Sum.

C. Contractor may stop the Work for failure of Port to pay undisputed amounts. The Contractor may stop Work under the Contract if the Port does not pay undisputed amounts due and owing to the Contractor within fifteen (15) days of the date established in the Contract Documents. If the Port fails to pay undisputed amounts, the Contractor may, upon fifteen (15) additional days' written notice to the Port, during which the Port can cure, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately, and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay, and start-up.

9.05 SUBCONTRACT ASSIGNMENT UPON TERMINATION

A. Subcontracts assigned upon termination. Each subcontract is hereby assigned by the Contractor to the Port provided that:

1. The Port requests that the subcontract be assigned.

2. The assignment is effective only after termination by the Port and only for those subcontracts that the Port accepts in writing.

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

When the Port accepts the assignment of a subcontract, the Port assumes the Contractor's rights and obligations under the subcontract, but only for events and payment obligations that arise after the date of the assignment.

ARTICLE 10 - BONDS

10.01 CONTRACTOR PERFORMANCE AND PAYMENT BONDS

A. Contractor to furnish performance and payment bonds. Within ten (10) days following its receipt of a notice of award, and as part of the Contract Sum, the Contractor shall secure and furnish duly executed performance and payment bonds using the forms furnished by the Port. The bonds shall be executed by a surety (or sureties) reasonably acceptable to the Port, admitted and licensed in the State of Washington, registered with the Washington State Insurance Commissioner, and possessing an A.M. Best rating of "A-, FSC (6)" or better and be authorized by the U.S. Department of the Treasury. Pursuant to RCW 39.08, the bonds shall be in an amount equal to the Contract Sum, and shall be conditioned only upon the faithful performance of the Contract by the Contractor within the Contract Time and upon the payment by the Contractor of all taxes, fees, and penalties to the State of Washington and all laborers, Subcontractors, and suppliers, and others who supply provisions, equipment, or supplies for the performance of the Work covered by this Contract. The bonds shall be signed by the person or persons legally authorized to bind the Contractor.

B. On contracts of one hundred fifty thousand dollars or less, at the option of the contractor as defined in RCW 39.10.210, the Port may, in lieu of the bond, retain ten percent of the contract amount for a period of thirty days after date of final acceptance, or until receipt of all necessary releases from the department of revenue, the Employment Security Department, and the Department of Labor and Industries and settlement of any liens filed under chapter 60.28 RCW, whichever is later. The recovery of unpaid wages and benefits must be the first priority for any actions filed against retainage held by a state agency or authorized local government.

   For contracts of one hundred fifty thousand dollars or less, the Port may accept a full payment and performance bond from an individual surety or sureties.

C. Port may notify surety. If the Port makes or receives a claim against the Contractor, the Port may, but is not obligated to, notify the Contractor's surety of the nature and amount of the claim. If the claim relates to a possibility of a Contractor's default, the Port may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

ARTICLE 11 - DISPUTE RESOLUTION

11.01 NOTICE OF PROTEST AND CLAIM

A. Dispute resolution procedure mandatory. All claims, direct or indirect, arising out of, or relating to, the Contract Documents or the breach thereof, shall be decided exclusively by the following alternative dispute resolution procedure, unless the parties mutually agree otherwise. If the Port and Contractor agree to a partnering process to assist in the resolution of disputes, the partnering process shall occur prior to, and not be in place of, the mandatory dispute resolution procedures set forth below.

B. Notice of protest defined. Except for claims requiring notice before proceeding with the affected Work as otherwise described in the Contract Documents, the Contractor shall provide immediate oral notice of protest to the Engineer prior to performing any disputed Work and shall submit a written notice of protest to the Port within seven (7) days of the occurrence of the event giving rise to the protest that includes a clear description of the event(s). The protest shall identify any point of disagreement, those portions of the Contract Documents believed to be applicable, and an estimate of quantities and costs involved. When a protest relates to cost, the Contractor shall keep full and complete records and shall permit the Port to have access to those records at any time as requested by the Port.

C. Claim defined. A claim is a demand by one of the parties seeking adjustment or interpretation of the Contract terms, payment of money, extension of time, or other relief with respect to the terms of the Contract Documents. The term “claim” also includes all disputes and matters in question between the Port and Contractor arising out of, or relating to, the Contract Documents. Claims must be initiated in writing and include a detailed factual statement and clear description of the claim providing all necessary dates, locations, and items of Work, the date or dates on which the events occurred that give rise to the claim, the names of employees or representatives knowledgeable about the claim, the specific provisions of the Contract Documents that support the claim, any documents or oral communications that support the claim, any proposed change in the Contract Sum (showing all components and calculations) and/or Contract Time (showing cause and analysis of the resultant delay in the critical path), and all other data supporting the claim. Claims shall also be submitted with a statement certifying, under penalty of perjury, that the claim as submitted is made in good faith, that the supporting cost and pricing data are true and accurate to the best of Contractor’s knowledge and belief, that the claim is fully supported, and that the amount requested accurately reflects the adjustment in the Contract Sum or Contract Time for which Contractor believes the Port is liable. A claim shall be deemed to include all changes, direct and indirect, in cost and in time to which the Contractor and Subcontractors of any tier are entitled and may not contain reservations of rights without the Port’s written approval; any unapproved reservations of rights shall be without effect.

D. Claim procedure. The Contractor shall submit a written claim within thirty (30) days of providing written notice of protest. The Contractor may delay submitting supporting data by an additional thirty (30) days if it notifies the Port in its claim that substantial data must be assembled. Any claim of a Subcontractor of any tier may be brought only through, and after review by and concurrence of, the Contractor.

E. Failure to comply with notice of protest and claim requirements waives claims. Any notice of protest by the Contractor and any claim of the Contractor, whether under the Contract or otherwise, must be made pursuant to, and in strict accordance with, the applicable provisions of the Contract. Failure to properly and timely submit a notice of protest or to timely submit a claim shall waive the claim. No act, omission, or knowledge, actual or constructive, of the Port shall waive the requirement for timely written notice of protest and a timely written claim, unless the Port and the Contractor sign an explicit, unequivocal written waiver approved by the Port. The Contractor expressly acknowledges and agrees that the Contractor’s failure to timely submit required notices of protest and/or timely submit claims has a substantial impact upon, and prejudices, the Port. For the purpose of calculating time periods, an “event giving rise to a claim,” among other things, is not a Request for Information, but rather is a response that the Contractor believes would change the Contract Sum and/or Contract Time.

F. False claims. The Contractor shall not make any fraudulent misrepresentations, concealments, errors, omissions, or inducements to the Port in the formation or performance of the Contract. If the Contractor or a Subcontractor of any tier submits a false or frivolous claim to the Port, which for purposes of this Section 11.01(F) is defined as a claim based in whole or in part on a materially incorrect fact, statement, representation, assertion, or record, the Port shall be entitled to collect from the Contractor by offset or otherwise (without prejudice to any right or remedy of the Port) any and all costs and expenses, including investigation and consultant costs, incurred by the Port in investigating, responding to, and defending against the false or frivolous claim.

G. Compliance with lien and retainage statutes required. If a claim relates to, or is the subject of, a lien or retainage claim, the party asserting the claim may proceed in accordance with applicable law to comply with the notice and filing deadlines prior to resolution of the claim by mediation or by litigation.

H. Performance required pending claim resolution. Pending final resolution of a claim, the Contractor shall continue to perform the Contract and maintain the Baseline Project Schedule, and the Port shall continue to make payments of undisputed amounts due in accordance with the Contract Documents.

11.02 MEDIATION

A. Claims must be subject to mediation. At any time following the Port's receipt of a written claim, the Port may require that an officer of the Contractor and the Port's designee (all with authority to settle) meet, confer, and attempt to resolve a claim. If the claim is not resolved during this meeting, the claim shall be subject to mandatory mediation as a condition precedent to the initiation of litigation. This requirement can be waived only by an explicit, written waiver signed by the Port and the Contractor.

B. Mediation procedure. A request for mediation shall be filed in writing with the other party to the Contract, and the parties shall promptly attempt to agree upon a mediator. If the parties have not reached agreement within thirty (30) days of the request, either party may file the request with the American Arbitration Association, or such other alternative dispute resolution service to which the parties mutually agree, with a copy to the other party, and the mediation shall be administered by the American Arbitration Association (or other agreed service). The parties to the mediation shall share the mediator's fee and any filing fees equally. The mediation shall be held in Pierce County, Washington, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof. Unless the Port and the Contractor mutually agree in writing otherwise, all claims shall be considered at a mediation session that shall occur prior to Final Completion.

11.03 LITIGATION

A. Claims not resolved by mediation are subject to litigation. Claims not resolved through mediation shall be resolved by litigation, unless the parties mutually agree otherwise. The venue for any litigation shall be Pierce County, Washington. The Contractor may bring no litigation on claims, unless such claims have been properly raised and considered in the procedures of this Article 11. The Contractor must demonstrate in any litigation that it complied with all requirements of this Article.

B. Litigation must be commenced promptly. All unresolved claims of the Contractor shall be waived and released, unless the Contractor has complied with the requirements of the Contract Documents, and litigation is served and filed within 180 days of the date of Substantial Completion approved in writing by the Port or termination of the Contract. The pendency of mediation (the time period between receipt by the non-requesting party of a written mediation request and the date of mediation) shall toll these deadlines until the earlier of the mediator providing written notice to the parties of impasse, or thirty (30) days after the date of the mediation session.

C. Port not responsible for attorneys' fees. Neither the Contractor nor a Subcontractor of any tier, whether claiming under a bond or lien statute or otherwise, shall be entitled to attorneys' fees directly or indirectly from the Port (but may recover attorneys' fees from the bond or statutory retainage fund itself to the extent allowable under law).

D. Port may join Contractor in dispute. The Port may join the Contractor as a party to any litigation or arbitration involving the alleged fault, responsibility, or breach of contract of the Contractor or Subcontractor of any tier.

ARTICLE 12 - MISCELLANEOUS

12.01 GENERAL

A. Rights and remedies are cumulative. The rights and remedies of the Port set forth in the Contract Documents are cumulative, and in addition to and not in limitation of, any rights and remedies otherwise available to the Port. The pursuit of any remedy by the Port shall not be construed to bar the Port from the pursuit of any other remedy in the event of similar, different, or subsequent breaches of this Contract. All such rights of the Port shall survive completion of the Project or termination of the Contractor.

B. Reserved rights do not give rise to duty. The rights reserved or possessed by the Port to take any action shall not give rise to a duty for the Port to exercise any such right.

12.02 WAIVER

A. Waiver must be in writing and authorized by Port. Waiver of any provisions of the Contract Documents must be in writing and authorized by the Port. No other waiver is valid on behalf of the Port.

B. Inaction or delay not a waiver. No action, delay in acting, or failure to act by the Port shall constitute a waiver of any right or remedy of the Port, or constitute an approval or acquiescence of any breach or defect in the Work, nor shall any delay or failure of the Port to act waive or otherwise prejudice the right of the Port to enforce a right or remedy at any subsequent time.

C. Claim negotiation not a waiver. The fact that the Port and the Contractor may consider, discuss, or negotiate a claim that has or may have been defective or untimely under the Contract, shall not constitute a waiver of the provisions of the Contract Documents, unless the Port and the Contractor sign an explicit, unequivocal waiver.

12.03 GOVERNING LAW

A. Washington law governs. This Contract and the rights and duties of the parties hereunder shall be governed by the internal laws of the State of Washington, without regard to its conflict of law principles.

12.04 COMPLIANCE WITH LAW

A. Contractor to comply with applicable laws. The Contractor shall at all times comply with all applicable Federal, State and local laws, ordinances, and regulations. This compliance shall include, but is not limited to, the payment of all applicable taxes, royalties, license fees, penalties, and duties.

B. Contractor to provide required notices. The Contractor shall give notices required by all applicable Federal, State and local laws, ordinances, and regulations bearing on the Work.

C. Contractor to confine operations at site to permitted areas. The Contractor shall confine operations at the Project site to areas permitted by applicable laws, ordinances, permits, rules and regulations, and lawful orders of public authorities and the Contract Documents.

12.05 ASSIGNMENT

A. Assignment. The Port and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party and to the partners, successors, assigns, and legal representatives of such other party. The Contractor may not assign, transfer, or novate all or any portion of the Contract, including but not limited to, any claim or right to the Contract Sum, without the Port's prior written consent. If the Contractor attempts to make an assignment, transfer, or novation without the Port's consent, the assignment shall be of no effect, and Contractor shall nevertheless remain legally responsible for all obligations under the Contract. The Contractor also shall not assign or transfer, to any third party, any claims it may have against the Port arising under the Contract or otherwise related to the Project.

12.06 TIME LIMIT ON CAUSES OF ACTION

A. Time limit on causes of action. The Port and Contractor shall commence all causes of action, whether in contract, tort, breach of warranty, or otherwise, against the other arising out of, or related to, the Contract in accordance with the requirements of the dispute resolution procedure set forth in Article 11 of these General Conditions, within the time period specified by applicable law, and within the time limits identified in the Contract Documents. The Contractor waives all claims and causes of action not commenced in accordance with this Section 12.06.

12.07 SERVICE OF NOTICE

A. Notice. Written notice under the Contract Documents by either the Contractor or Port may be served on the other party by personal service, electronic or facsimile transmission, or delivery service to the last address provided in writing to the other party. For the purpose of measuring time, notice shall be deemed to be received by the other party on the next business day following the sender's electronic or facsimile transmittal or delivery by delivery service.

12.08 RECORDS

A. Contractor and Subcontractors to maintain records and cooperate with Port audit. The Contractor and Subcontractors of any tier shall maintain books, ledgers, records, documents, estimates, bids, correspondence, logs, schedules, emails, and other tangible and electronic data and evidence relating or pertaining to costs and/or performance of the Contract ("records") to such extent, and in such detail, as will properly reflect and fully support compliance with the Contract Documents and with all costs, charges, and other amounts of whatever nature. The Contractor shall preserve these records for a period of six (6) years following the date of Final Acceptance under the Contract. Within seven (7) days of the Port's request, both during the Project and for six (6) years following Final Acceptance, the Contractor and Subcontractors of any tier shall make available, at their office during normal business hours, all records for inspection, audit, and reproduction (including electronic reproduction) by the Port or its representatives; failure to fully comply with this requirement shall constitute a material breach of contract and a waiver of all claims by the Contractor and Subcontractors of any tier.

B. Rights under RCW 42.56. The Contractor agrees, on behalf of itself and Subcontractors of any tier, that any rights under Chapter 42.56 RCW will commence at Final Acceptance, and that the invocation of such rights at any time by the Contractor or a Subcontractor of any tier, or their respective representatives, shall initiate an equivalent right to disclosures from the Contractor and Subcontractors of any tier for the benefit of the Port.

12.09 STATUTES

A. Contractor to comply with Washington statutes. The Contractor shall abide by the provisions of all applicable statutes, regulations, and other laws. Although a number of statutes are referenced in the Contract Documents, these references are not meant to be, and are not, a complete list.

1. Pursuant to RCW 39.06, "Registration, Licensing of Contractors," the Contractor shall be registered and licensed as required by the laws of the State of Washington, including but not limited to RCW 18.27, "Registration of Contractors," and shall satisfy all State of Washington bonding and insurance requirements. The Contractor shall also have a current state Unified Business Identifier number; have industrial insurance coverage for the Contractor's employees working in Washington as required by Title 51 RCW; have an Employment Security Department number as required by Title 50 RCW; have a state excise tax registration number as required in Title 82 RCW; and not be disqualified from bidding on any public works contract under RCW 39.06.010 (unregistered or unlicensed contractors) or RCW 39.12.065(3) (prevailing wage violations).
2. The Contractor shall comply with all applicable provisions of RCW 49.28, "Hours of Labor."
3. The Contractor shall comply with pertinent statutory provisions relating to public works of RCW 49.60, "Discrimination."
4. The Contractor shall comply with pertinent statutory provisions relating to public works of RCW 70.92, "Provisions in Buildings for Aged and Handicapped Persons," and the Americans with Disabilities Act.
5. Pursuant to RCW 50.24, "Contributions by Employers," in general, and RCW 50.24.130 in particular, the Contractor shall pay contributions for wages for personal services performed under this Contract or arrange for an acceptable bond.
6. The Contractor shall comply with pertinent provisions of RCW 49.17, "Washington Industrial Safety and Health Act," and Chapter 296-155 WAC, "Safety Standards for Construction Work."

7. Pursuant to RCW 49.70, “Worker and Community Right to Know Act,” and WAC 296-62-054 et seq., the Contractor shall provide to the Port, and have copies available at the Project site, a workplace survey or material safety data sheets for all “hazardous” chemicals under the control or use of Contractor or any Subcontractor of any tier.
8. All products and materials incorporated into the Project as part of the Work shall be certified as “asbestos-free” and “lead-free” by United States standards, and shall also be free of all hazardous materials or substances. At the completion of the Project, the Contractor shall submit certifications of asbestos-free and of lead-free materials certifying that all materials and products incorporated into the Work meet the requirements of this Section, and shall also certify that materials and products incorporated into the Work are free of hazardous materials and substances.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes requirements for the Contractor's insurance.

1.02 SUBMITTAL REQUIREMENTS

A. Evidence of the required insurance within ten (10) days of the issued Notice of Award to the Contractor.

B. Updated evidence of insurance as required until final completion.

1.03 COMMERCIAL GENERAL LIABILITY (CGL) INSURANCE

A. The Contractor shall secure and maintain until Final Completion, at its sole cost and expense, the following insurance in carriers reasonably acceptable to the Port, licensed in the State of Washington, registered with the Washington State Insurance Commissioner, and possessing an A.M. Best rating of "A-, FSC six (6)" or better.

B. The Port of Tacoma (Port) will be included as additional insureds for both ongoing and completed operations by endorsement to the policy using ISO Form CG 20 10 11 85 or forms CG 20 10 04 13 and CG 20 37 04 13 (or equivalent coverage endorsements). The inclusion of the Port as additional insureds shall not create premium liability for the Port.

   Also, by endorsement to the policy, there shall be:

   1. An express waiver of subrogation in favor of the Port;
   2. A cross liabilities clause; and
   3. An endorsement stating that the Contractor's policy is primary and not contributory with any insurance carried by the Port.

C. If the Contractor, Supplier, or Subcontractors will perform any work requiring the use of a licensed professional, per RCW 18, the Contractor shall provide evidence to the Port of professional liability insurance in amounts not less than $1,000,000.

D. This insurance shall cover all of the Contractor's operations, of whatever nature, connected in any way with the Contract, including any operations performed by the Contractor's Subcontractors of any tier. **It is the obligation of the Contractor to ensure that all Subcontractors (at whatever level) carry a similar program that provides the identified types of coverage, limits of liability, inclusion of the Port as additional insured(s), waiver of subrogation and cross liabilities clause.** The Port reserves the right to reject any insurance policy as to company, form, or substance. Contractor's failure to provide, or the Port's acceptance of, the Contractor's certificate of insurance does not waive the Contractor's obligation to comply with the insurance requirements of the Contract as specifically described below:

   1. Commercial General Liability Insurance on an Occurrence Form Basis including, but not limited to:
      a. Bodily Injury Liability;
      b. Property Damage Liability;
      c. Contractual Liability;
      d. Products - Completed Operations Liability;

e. Personal Injury Liability;

Alternatively, a Commercial General Liability (CGL) policy is acceptable if all of the above coverages are incorporated in the policy and there are no marine exclusions that will remove coverage for either vessels or work done by or above or around the water.

2. Comprehensive Automobile Liability including, but not limited to:

a. Bodily Injury Liability;

b. Property Damage Liability;

c. Personal Injury Liability;

d. Owned and Non-Owned Automobile Liability; and

e. Hired and Borrowed Automobile Liability.

3. Technology Professional Liability Errors and Omissions Insurance appropriate to the Consultant's profession and work hereunder, with limits not less than $2,000,000 per occurrence. Coverage shall be sufficiently broad to respond to the duties and obligations as is undertaken by the Vendor in this agreement and shall include, but not be limited to, claims involving infringement of intellectual property, copyright, trademark, invasion of privacy violations, information theft, release of private information, extortion and network security. The policy shall provide coverage for breach response costs as well as regulatory fines and penalties as well as credit monitoring expenses with limits sufficient to respond to these obligations.

The policy shall include, or be endorsed to include, **property damage liability coverage** for damage to, alteration of, loss of, or destruction of electronic data and/or information "property" of the Agency in the care, custody, or control of the Vendor.

E. Except where indicated above, the limits of all insurance required to be provided by the Contractor shall be not less than $2,000,000 for each occurrence. If the coverage is aggregated, the coverage shall be no less than two times the per occurrence or per claim limit. However, coverage in the amounts of these minimum limits shall not be construed as to relieve the Contractor from liability in excess of such limits. Any additional insured endorsement shall NOT be limited to the amounts specified by this Contract, unless expressly waived in writing by the Port.

F. Contractor shall certify that its operations are covered by the Washington State Worker's Compensation Fund. The Contractor shall provide its Account Number or, if self-insured, its Certificate of Qualification Number. The Contractor shall also provide evidence of Stop-Gap Employers' Liability Insurance.

G. The Contractor shall furnish, within ten (10) days following issuance of the Notice of Award, a certificate of insurance satisfactory to the Port evidencing that insurance in the types and minimum amounts required by the Contract Documents has been secured. The Certificate of Insurance shall be signed by an authorized representative of the insurer together with a copy of the endorsement, which shows that the Port are named as additional insured(s).

H. Contractor shall provide at least forty-five (45) days prior written notice to the Port of any termination or material change, or ten (10) day's-notice in the case of non-payment of premium(s).

I. If the Contractor is required to make corrections to the Work after Final Completion, the Contractor shall obtain at its own expense, prior to the commencement of any corrective work, insurance coverage as required by the Contract Documents, which coverage shall be maintained until the corrections to the Work have been completed and accepted by the Port.

1.04 BUILDER'S RISK INSURANCE

A. Until Final Completion of the Work, the construction Work is at the risk of the Contractor and no partial payment shall constitute acceptance of the Work or relieve the Contractor of responsibility of completing the Work under the Contract.

B. To the extent the Work provided under this Contract does not include the construction, rehabilitation or repair of any dam, road or bridge, and whenever the estimated cost of the Work is less than $25,000,000, the Port and Contractor acknowledge that the Port will purchase, or has purchased, from a company or companies lawfully authorized and admitted to do business in Washington, property insurance written on a Builder's Risk "all-risk" (including Earthquake and Flood with applicable sub-limits) or equivalent policy form to cover the course of construction in the amount of the full insurable value thereof. This property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the Port has an insurable interest in the property, whichever is later. Without further endorsement, the coverage afforded by this insurance includes the interests of the Port, the Contractor, and Subcontractors of any tier on the Project. Coverage for materials intended to be installed in the facility will be covered by the Builder's Risk policy. Losses up to the deductible amount, and payment of any deductible amount, shall be the responsibility of the Contractor. All tools and equipment not intended as part of the construction or installation (including but not limited to Contractor's equipment and tools) will NOT be covered by the policy.

To the extent the Work provided under this Contract involves any dam, roadway or bridge, the value of which exceeds $250,000, or whenever the estimated cost of the Work is equal to or greater than $25,000,000, Contractor will purchase from a company or companies lawfully authorized and admitted to do business in Washington, property insurance written on a Builder's Risk "all-risk" (excluding Earthquake and Flood with applicable sub-limits) or equivalent policy form to cover the course of construction in the amount of the full insurable value thereof. This Builder's Risk insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the Port has an insurable interest in the property, whichever is later. Contractor shall provide evidence satisfactory to the Port confirming the coverage afforded by this insurance shall include the interests of the Port, the Contractor, and Subcontractors of any tier on the Project. Coverage for materials intended to be installed in the facility will be covered by the Builder's Risk policy purchased by the Contractor. Losses up to the deductible amount, and payment of any deductible amount, shall be the responsibility of the Contractor.

In all instances, the Contractor shall obtain property insurance for all Contractor-owned equipment and tools and, in the event of loss, payment of any deductible amount shall be the responsibility of the Contractor.

PART 2 - PRODUCTS - NOT USED

PART 3 - PRODUCTS - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 PREVAILING AND OTHER REQUIRED WAGES

A. The Contractor shall pay (and shall ensure that all Subcontractors of any tier pay) all prevailing wages and other wages (such as Davis-Bacon Act wages) applicable to the Project.

B. Pursuant to RCW 39.12, “Prevailing Wages on Public Works,” no worker, laborer, or mechanic employed in the performance of any part of the Work shall be paid less than the “prevailing rate of wage” in effect as of the date that bids are due.

1. Based on the Bid Date, the applicable effective date for prevailing wages for this Project is 08/21/2024.

C. The State of Washington prevailing wage rates applicable for this public works Project, which is located in Pierce County, may be found at the following website address of the Department of Labor and Industries:
https://fortress.wa.gov/lni/wagelookup/prvWagelookup.aspx

D. The schedule of the prevailing wage rates is made a part of the Contract Documents by reference as though fully set forth herein, and a printed copy of the applicable prevailing wage rates are also available for viewing at the Port Administration Building, located at 1 Sitcum Plaza, Tacoma, WA 98421 (253-383-5841). Upon request to the Procurement Department at procurement@portoftacoma.com, the Port will email or mail a hard copy of the applicable Journey Level prevailing wages for this Project.

E. Questions relating to prevailing wage data should be addressed to the Industrial Statistician.

Mailing Address: Washington State Department of Labor and Industries
Prevailing Wage Office
P.O. Box 44540
Olympia, WA 98504

Telephone: (360) 902-5335

Facsimile: (360) 902-5300

1. If there is any discrepancy between the provided schedule of prevailing wage rates and the published rates applicable under WAC 296-127-011, the applicable published rates shall apply with no increase in the Contract Sum. It is the Contractor’s responsibility to ensure that the correct prevailing wage rates are paid.

F. Statement to Pay Prevailing Wages

1. Prior to any payment being made by the Port under this Contract, the Contractor, and each Subcontractor of any tier, shall file a Statement of Intent to Pay Prevailing Wages with the Department of Labor and Industries for approval.

2. The statement shall include the hourly wage rate to be paid to each classification of workers entitled to prevailing wages, which shall not be less than the prevailing rate of wage, and the estimated number of workers in each classification employed on the Project by the Contractor or a Subcontractor of any tier, as well as the Contractor’s contractor registration number and other information required by the Department of Labor and Industries.

3. The statement, and any supplemental statements, shall be filed in accordance with the requirements of the Department of Labor and Industries. No progress payment shall be made until the Port receives such certified statement.

G. The Contractor shall post, in a location readily visible to workers, at the Project site: (i) a copy of the Statement of Intent to Pay Prevailing Wages approved by the Industrial Statistician of the Department of Labor and Industries and (ii) the address and telephone number of the Industrial Statistician of the Department of Labor and Industries to whom a complaint or inquiry concerning prevailing wages may be directed.

H. If a State of Washington prevailing wage rate conflicts with another applicable wage rate (such as Davis-Bacon Act wage rate) for the same labor classification, the higher of the two shall govern.

I. Pursuant to RCW 39.12.060, if any dispute arises concerning the appropriate prevailing wage rate for work of a similar nature, and the dispute cannot be adjusted by the parties in interest, including labor and management representatives, the matter shall be referred for arbitration to the Director of the Department of Labor and Industries, and his or her decision shall be final and conclusive and binding on all parties involved in the dispute.

J. Immediately following the end of all Work completed under this Contract, the Contractor and each Subcontractor of any tier, shall file an approved Affidavit of Wages Paid with the Department of Labor and Industries.

K. The Contractor shall defend (at the Contractor's sole cost, with legal counsel approved by Port), indemnify, and hold the Port harmless from all liabilities, obligations, claims, demands, damages, disbursements, lawsuits, losses, fines, penalties, costs, and expenses, whether direct, indirect, including, but not limited to, attorneys' fees and consultants' fees and other costs and expenses, from any violation or alleged violation by the Contractor or any Subcontractor of any tier of RCW 39.12 ("Prevailing Wages on Public Works") or RCW Title 51 ("Industrial Insurance"), including, but not limited to, RCW 51.12.050.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 REQUIREMENTS APPLICABLE PORT-WIDE

A. The Contractor shall submit, prior to the start of Work, a list of emergency contact numbers for itself and its Subcontractors, Suppliers, and manufacturer representatives. Each person on the Project site shall have a valid identification card that is tamper proof with laminated photo identification, such as one (1) of the following:

1. State-issued Driver's license (also required if driving a vehicle)
2. Card issued by a governmental agency
3. Passport
4. Pacific Maritime Association card
5. Labor organization identification card

B. Identification cards shall be visible while on the Project site or easily displayed when requested.

1.02 TRANSPORTATION WORKER IDENTIFICATION CARD (TWIC) SUMMARY

A. TWIC is required for all personnel needing unescorted access to secure and restricted areas of Port facilities subject to 33 CFR 105, including truckers, surveyors, construction personnel, and delivery personnel. Secure areas are those areas with security measures for access control in accordance with a Coast Guard approved security plan. Restricted areas are those areas within a secure area that require increased limited access and a higher degree of security protection. New terminals under construction prior to terminal operations may not be designated secure areas. Construction on existing maritime transportation facilities and punchlist or other type of work requirements on facilities that have been certified under 33 CFR will require a TWIC.

B. Contractors should allow for application and enrollment for the security threat assessment and issuance of TWIC when submitting a bid.

1.03 ESCORTING

A. To access restricted Port facilities, all un-credentialed individuals must be accompanied by a person who has been issued a TWIC and trained as an escort at that specific facility. Each restricted facility has their own guidelines for escorting. Having escort training at one facility does not qualify you to escort at other facilities. Prior to conducting escort services for non-TWIC personnel, the escorts are required to contact the Facility Security Officer at the gate for verification they are on the escort list and to document who is being escorted. For required documentation, upon completion of escorting, the escort is to inform the Security officer that the escort is complete. It is the Contractor's responsibility to schedule escort training with the Facility Security Officer.

B. For more information, refer to the Port Security website at: http://www.portoftacoma.com/shipping/security

C. For Project specific information, refer to Section 01 14 00 - Work Restrictions.

1.04 ELIGIBILITY FOR TWIC

A. Refer to the Transportation Worker Identification Credential website at: https://www.tsa.gov/for-industry/twic for information on eligibility and applying for TWIC.

1.05 TWIC USE AND DISPLAY

A. Each worker granted unescorted access to secure areas of a facility or vessel must present their cards to authorized personnel, who will compare the holder to his or her photo, inspect security features on the TWIC, and evaluate the card for signs of tampering. The Coast Guard will verify TWIC's when conducting vessel and facility inspections and during spot checks using hand-held scanners, ensuring credentials are valid.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE

A. The Work under this contract is to provide, furnish and install all labor, materials, and equipment required to complete the work, installed, tested, and ready for use, and as described in these documents.

1. This Section specifies the general nature of the work and addresses work sequence and constraints. Work is more specifically defined in the other sections of these bidding documents.

a. The project consists of:

1) Install a Cummins DFEK Commercial Diesel Generator Set, 500kW Standby 60Hz, to power the Port of Tacoma Maintenance shop under a power outage event. The Cummins generator will be purchased by the Port of Tacoma and contractor will install the generator ready for use.

1.02 LOCATION

A. The work is located at 802 Port Center Road, Tacoma, Washington.

1.03 CONTRACTOR ACCESS AND USE OF PREMISES

A. Activity Regulations

1. Ensure Contractor personnel deployed to the project become familiar with and follow all regulations or restrictions established by the Engineer.

B. Occupied Building

1. The Contractor will be working in existing buildings which are occupied during normal business hours, as stipulated above.

2. Protect materials and equipment in areas adjoining the immediate work area.

C. Working Facility

1. The Facility will remain in operation for the duration of construction. The Contractor shall conduct all items of the Work in such a manner as to prevent interference with the normal operations of the Facility.

2. TWIC Escorting Requirements:

a. TWIC escort personnel are not permitted to work assignments outside of observing non-TWIC workers.

b. TWIC escort personnel may observe a maximum of five non-TWIC workers.

D. Work Site Regulations

1. Keep within the limits of work and assigned avenues of ingress and egress. Do not enter any areas outside the designated work location unless previously approved by the Engineer. The Contractor must comply with the following conditions:

a. Restore all common areas to a clean and useable condition that permits the resumption of Tenant operations after the Contractor ceases daily work.

b. Be responsible for control and security of Contractor-owned equipment and materials at the work site. Report to Port Security (phone (253) 383-9472) any missing/lost/stolen property.

c. Ensure all materials, tools and equipment will be removed from the site or secured within the designated laydown area at the end of each shift.

1.04 CONSTRAINTS - GENERAL

A. Constraints for Work at Site

1. Electrical Work Constraints:

a. Power outages to perform the installtion should be minimized during business hours and be performed after business hours or during the weekend if outages are anticipated more than 4 hours.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies work sequence and constraints.

B. The purpose of the milestones, sequence and limitations of construction are to ensure that the Contractor understands the requirements and limitations on its work by the specific characteristics of the Contract, schedules and conducts work in a manner consistent with achieving these purposes, and complies with the construction schedule, the specific sequence, constraints, milestones and limitations of work specified.

C. Sequence of construction. Plan the sequence of construction to accommodate all the requirements of the specifications. The Contract Price shall include all specified requirements as described in this Section.

1.02 CONTRACTOR ACCESS AND USE OF PREMISES

A. Activity Regulations

1. Ensure Contractor personnel deployed to the project become familiar with and follow all regulations or restrictions established by the Engineer.

B. Occupied Building

1. The Contractor will be working in existing buildings which are occupied during normal business hours, as stipulated below.

2. Protect materials and equipment in areas adjoining the immediate work area.

C. Working Facility

1. The Facility will remain in operation for the duration of construction. The Contractor shall conduct all items of the Work in such a manner as to prevent interference with the normal operations of the Facility.

2. TWIC Escorting Requirements:

a. TWIC escort personnel are not permitted to work assignments outside of observing non-TWIC workers.

b. TWIC escort personnel may observe a maximum of five non-TWIC workers

D. Work Site Regulations

1. Keep within the limits of work and assigned avenues of ingress and egress. Do not enter any areas outside the designated work location unless previously approved by the Engineer. The Contractor must comply with the following conditions:

a. Restore all common areas to a clean and useable condition that permits the resumption of Tenant operations after the Contractor ceases daily work.

b. Be responsible for control and security of Contractor-owned equipment and materials at the work site. Report to Port Security (phone (253) 383-9472) any missing/lost/stolen property.

c. Ensure all materials, tools and equipment will be removed from the site or secured within the designated laydown area at the end of each shift.

1.03 CONSTRAINTS - GENERAL

A. Constraints for Work at Site

1. Electrical Work Constraints:

a. Power outages to perform the installtion should be minimized during business hours and be performed after business hours or during the weekend if outages are anticipated more than 4 hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 PAYMENT PROCEDURES

A. Monthly pay estimates shall clearly identify the work performed for the given time period based on the approved Schedule of Values.

1. At the Pre-construction meeting, the Engineer and the Contractor shall agree upon a date each month when payment applications shall be submitted.

B. For each pay estimate the Contractor shall submit the following:

1. Completed Contractor invoice and updated Schedule of Values tracking sheet as required by Division 01 or as established by the Engineer.

2. Baseline Project Schedule and narrative updated as required by Section 01 32 16 of the Project Manual.

3. Completed “Amounts Paid to Subcontracts and Suppliers” showing total contract amount, amount paid this estimate, total paid to date, and balance owing.

4. Completed “Conditional Release and Waiver of Liens and Claims.”

C. Prior to submitting a payment application, the Contractor and Engineer shall meet each month to review the work accomplished to determine the actual quantities including labor, materials and equipment charges to be billed.

1. Prior to the payment application meeting, the Contractor shall submit to the Engineer all measurement documentation as referenced in these contract documents; to include all measurement by weight, volume or field.

2. For all change work being done on a force account basis, the Contractor shall submit prior to meeting with Engineer all Force Account back-up documentation as required to process the payment application where Force Account work is being billed. The Engineer and the Contractor shall review the documentation at the payment application meeting to verify quantities and review the work accomplished.

3. The Contractor shall bring a copy of all documentation to the pay application meeting with the Engineer.

4. The Contractor shall submit the updated baseline project schedule for review prior to submitting the payment application to ensure the payment processing is not held up due to necessary schedule revisions.

D. Following the Engineers’ review, the Contractor shall submit the agreed upon pay estimate electronically, with complete supporting documentation, using e-Builder®.

1.03 PAYMENT PRICING

A. Pricing for the various lump sum or unit prices in the Bid Form, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the work in accordance with the requirements of the Contract Documents.

B. Pricing also includes all costs of compliance with the regulations of public agencies having jurisdiction, including safety and health requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA).

C. No separate payment will be made for any item that is not specifically set forth in the Bid Form, and all costs therefore shall be included in the prices named in the Bid Form for the various appurtenant items of work.

D. All other work not specifically mentioned in the measurement and payment sections identified below shall be considered incidental to the work performed and merged into the various unit and lump sum prices bid. Payment for work under one item will not be paid for under any other item.

E. The Port of Tacoma reserves the right to make changes should unforeseen conditions necessitate such changes. Where work is on a unit price basis, the actual quantities occasioned by such changes shall govern the compensation.

1.04 LUMP SUM MEASUREMENT

A. Lump sum measurement will be for the entire item, unit of Work, structure, or combination thereof, as specified and as indicated in the Contractor's submitted bid.

1. If the Contractor requests progress payments for lump sum items, such progress payments will be made in accordance with an approved Schedule of Values. The quantity for payment for completed work shall be an estimated percentage of the lump sum amount, agreed to between the Engineer and Contractor, payable in monthly progress payments in increments proportional to the work performed in amounts as agreed between the Engineer and the Contractor.

1.05 MEASUREMENT OF QUANTITIES FOR UNIT PRICES

A. Measurement Standards:

1. All Work to be paid for at a contract price per unit measurement, as indicated in the Contractor's submitted bid, will be measured by the Engineer in accordance with United States Standard Measures.

B. Measurement by Weight:

1. Reinforcing steel, steel shapes, castings, miscellaneous metal, metal fabrications, and similar items to be paid for by weight shall be measured by scale or by handbook weights for the type and quantity of material actually furnished and incorporated into the Work.

2. Unless shipped by rail, material to be measured and paid for by weight shall be weighed on sealed scales regularly inspected by the Washington State Department of Agriculture's Weights and Measures Section or its designated representative. Measurement shall be furnished by and at the expense of the Contractor. All weighing, measuring, and metering devices shall be suitable for the purpose intended and shall conform to the tolerances and specifications as outlined in Washington State Department of Transportation Standard Specifications, Division 1, General Requirements, Article 1-09.2, Weighing Equipment.

3. Provide or utilize platform scales of sufficient size and capacity to permit the entire vehicle or combination of vehicles to rest on the scale platform while being weighed. Combination vehicles may be weighed as separate units provided they are disconnected while being weighed. Scales shall be inspected and certified as often as the Engineer may deem necessary to ascertain accuracy. Costs incurred as a result of regulating, adjusting, testing, inspecting, and certifying scales shall be borne by the Contractor.

4. A licensed weighmaster shall weigh all Contractor-furnished materials. The Engineer may be present to witness the weighing and to check and compile the daily record of such scale weights. However, in any case, the Engineer will require that the Contractor furnish weight slips and daily summary weigh sheets. In such cases, furnish a duplicate weight slip or a load slip for each vehicle weighed, and deliver the slip to the Engineer at the point of delivery of the material.
5. If the material is shipped by rail, the certified car weights will be accepted, provided only actual weight of material will be paid for and not minimum car weights used for assessing freight tariff. Car weights will not be acceptable for material to be passed through mixing plants. Material to be measured by weight shall be weighed separately for each bid item under which it is to be paid.
6. Trucks used to haul material being paid for by weight shall be weighed empty daily and at such additional times as the Engineer may require. Each truck shall bear a plainly legible identification mark. The Engineer may require the weight of the material be verified by weighing empty and loaded trucks on such other scales as the Engineer may designate.

C. Measurement by Volume:
   1. Measurement by volume will be by the cubic dimension indicated in the Contractor's submitted bid. Method of volume measurement will be by the unit volume in place or removed as shown on the Contract Drawings or as specified.
   2. When material is to be measured and paid for on a volume basis and it is impractical to determine the volume by the specified method of measurement, or when requested by the Contractor in writing and accepted by the Engineer in writing, the material may be weighed in accordance with the requirements specified for weight measurement. Such weights will be converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Resident Engineer and shall be agreed to by the Contractor before such method of measurement of pay quantities will be accepted.

D. Measurement by Area: Measurement by area will be by the square dimension shown on the Contract Drawings or as specified. Method of square measurement will be as specified.

E. Linear Measurement: Linear measurement will be by the linear dimension listed or indicated in the Contractor's submitted bid. Unless otherwise indicated, items, components, or Work to be measured on a linear basis will be measured at the centerline of the item in place.

F. Field Measurement for Payment:
   1. The Contractor shall take all measurements by providing equipment, workers, and survey crews as required to measure quantities in accordance with the provisions for measurement specified herein. No allowance will be made for specified tolerances.
   2. The Engineer will verify all quantities of Work performed by the Contractor on a unit-price basis, for progress payment purposes.

1.06 REJECTED, EXCESS, OR WASTED MATERIALS

A. Quantities of material wasted or disposed of in a manner not called for under the Contract; rejected loads of material, including material rejected after it has been placed by reasons of the failure of the Contractor to conform to the provisions of the Contract; material not unloaded from the transporting vehicle; material placed outside the lines indicated on the Contract Drawings or established by the Engineer; or material remaining on hand after completion of the Work, will not be paid for, and such quantities shall not be included in the final total quantities. No additional compensation will be permitted for loading, hauling, and disposing of rejected material.

1.07 MEASUREMENT AND PAYMENT

A. Item #2 and 5: Mobilization and Demobilization

1. Payment for Mobilization and Demobilization shall be for preparatory work and operations performed by the Contractor including, but not limited to, those necessary for the movement of its personnel, equipment, supplies and incidentals to and from the project site; temporary facilities and controls; for the establishment and removal of its offices, buildings and other facilities necessary for work on the project; for other work and operations which it must perform or costs it must incur before beginning production work on the various items on the project site, and for removal of personnel, equipment, supplies, offices, building facilities, sheds, fencing, and other incidentals from the site.

2. Mobilization and Demobilization shall be paid at the lump sum price listed in the Contractor's submitted bid. Incremental payment shall be made for each location as follows:

a. 40% after completion of 5% of the total contract amount of other bid items have been earned.

b. 40% after completion of 20% of the total contract amount of other bid items have been earned.

c. 20% after completion of all work on the project has been completed, including cleanup and acceptance of the project by the Port.

B. Item #1: Project Administration

1. Item Description: The Work of this item includes all administrative costs associated with administering and supervising the project including, but not limited to supervision of personnel, coordination of all work activities, coordination of subcontractors and/or suppliers, preparation and transmittal of submittals, permit acquisitions, for premiums on bonds and insurance for the project, and project overhead.

2. Measurement: This item will be measured based on a percentage complete for the overall lump sum amount.

3. Payment: This item will be paid for at the Contract lump sum price as specified in the Contractor's submitted bid, in accordance with the approved Schedule of Values.

C. Item #3: Construction and Material

1. Item Description: The Work of this item includes all construction work and materials involved.

2. Measurement: This item will be measured based on a percentage complete for the overall lump sum amount.

3. Payment: This item will be paid for at the Contract lump sum price as specified in the Contractor's submitted bid, in accordance with the approved Schedule of Values.

D. Item #4: Electrical and Material.

1. Item Description: The Work of this item includes all electrcial work and materials invlolved.
2. Measurement: This item will be measured based on a percentage complete for the overall lump sum unit.
3. Payment: This item will be paid for based on actual quantities for the period being billed.

E. Item #_____: Trench Safety Systems.

1. Item Description: The Work of this item includes shoring and safety systems for all trench excavations exceeding 4-foot depths.
2. Measurement: This item will be measured as a lump sum unit.
3. Payment: This item will be paid for at the Contract lump sum price as specified in the Contractor's submitted bid.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXEUCTION - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.02 SUBMITTALS

A. The Contractor shall submit for approval the following documentation to the Port for force account change orders:

1. List of Labor Rates

a. For the Contractor and each subcontractor, a list of labor rates for each trade applicable to the scope of work to be performed. These submitted rates shall be broken down to include the base wage, fringes, FICA, SUTA, FUTA, industrial insurance, and medical aid premiums as stated in the General Conditions. The rates shall not contain any travel time, safety, loss efficiency factors, overhead, or profit. Rates shall be submitted for straight time, overtime, and double time in a form acceptable to the Engineer. Contractor shall provide proof of all labor rate costs as required by the Engineer, including the submission of a copy of the most current Workers Compensation Rate Notice from Labor & Industries and a copy of the Unemployment Insurance Tax Rate notice from the Employment Security Department.

1) If labor rates change during the course of the project or additional labor rates become required to complete the work, the Contractor shall submit new rates for approval.

2. List of Equipment.

a. Submit for the Contractor and each subcontractor, a list of equipment and rates applicable to the scope of work to be performed. The equipment rates shall conform to the rates shown on Equipment Watch. A separate page from equipment watch detailing the hourly rate shall be submitted as backup documentation for each piece of equipment.

1) If the list of equipment and/or equipment rates changes during the course of the project or additional equipment becomes required to complete the work, the Contractor shall submit a new list and rates for approval.

1.03 METHOD TO CALCULATE ADJUSTMENTS TO CONTRACT PRICE

A. One of the following methods shall be used:

1. Unit Price Method;

2. Firm Fixed Price Method (Lump Sum); or,

3. Time and Materials Method (Force Account).

B. The Port preferred methods are firm fixed price or unit prices.

1.04 MINOR CHANGES IN THE WORK

A. Engineer will issue a written directive authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.05 PROPOSAL REQUESTS

A. Port-Initiated Proposal Requests: The Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Engineer are not instructions either to stop work in progress or to execute the proposed change.

2. Contractor shall submit a written proposal within the time specified in the General Conditions. The proposal shall represent the Contractor's offer to perform the requested work, and the pricing set forth within the proposal shall represent full, complete, and final compensation for the proposed change and any impacts to any other Contract Work, including any adjustments in the Contract Time.

a. Include a breakdown of the changed work in sufficient detail that permits the Engineer to substantiate the costs.

1) Generally, the cost breakdown should be divided into the time and materials categories listed in the General Conditions under Article 8.02.B for either Lump Sum Proposals or Force Account Proposals.

2) For Unit Price Proposals, include the quantity and description of all work involved in the unit pricing being proposed, along with a not to exceed total cost.

b. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or differing site conditions require modifications to the Contract, the Contractor may initiate a claim by submitting a request for a change to the Engineer.

1. Notify the Engineer immediately upon finding differing conditions prior to disturbing the site.

2. Provide follow-up written notification and differing site conditions proposal within the time frames set forth in the General Conditions.

3. Provide the differing site condition change proposal in the same or similar manner as described above under 1.05.A.

4. Comply with requirements in Section 00 26 00 Substitution Procedures if the proposed change requires substitution of one product or system for product or system specified.

5. Proposal Request Form: Use form acceptable to Engineer.

1.06 PROCEEDING WITH CHANGED WORK

A. The Engineer may issue a directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order per the General Conditions, Article 8.01.E.

1. The directive will contain a description of change in the Work and a not-to-exceed amount. It will designate the method to be followed to determine the change in the Contract Sum or the Contract Time.

1.07 CHANGE ORDER PROCEDURES

A. Issuance of Change Order

1. On approval of the Contractor's proposal, and following successful negotiations, the Engineer will issue a Change Order for signature by the Contractor and execution by the Engineer.
    a. The Contractor shall sign and return the Change Order to the Engineer within **four (4) days** following receipt of the Change Order from the Engineer. If the Contractor fails to return the signed Change Order within the allotted time, the Engineer may issue a Unilateral Change Directive.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes specifications for preparation, format, and submittal of Schedule of Values.

B. The Schedule of Values will establish unit prices for individual items of work.

C. The Schedule of Values will be the basis for payment of contract work.

1.02 PREPARATION

A. To facilitate monthly pay requests, develop the Schedule of Values based on the Contractor's submitted Bid Items. The Schedule of Values shall be used to provide an allocation of the Work for measurement and payment to a level of detail to ensure accurate payment for the Work accomplished. The Schedule of Values is based on unit priced bid items and a breakdown of each lump-sum bid item. The total dollars for the Schedule of Values shall total the bid amount.

B. Obtain the agreement of the Engineer on the Schedule of Values. No payment will be made prior to an agreed upon Schedule of Values.

C. Include an updated version of the Schedule of Values as changes occur. Update the Schedule of Values to include:

1. Dollars earned and percent complete for the current progress payment period,
2. Dollars earned and percent complete to-date, excluding the current progress payment period,
3. Total dollars earned and percent complete to-date,
4. Total dollars remaining, and
5. Changes resulting from Change Orders.

D. The total value of the line items in the Schedule of Values plus any approved Change Orders shall be equal to the current approved contract price.

E. The value of stored material shall be identified in the Schedule of Values with both a material-purchase activity and a separate corresponding installation activity in the Construction Schedule(s).

F. Include as exhibits, drawings or sketches as necessary, to better define the limits of pay items that are in close proximity and that have no clear boundary in the Contract Drawings.

1.03 SUBMITTAL

A. Submit preliminary Schedule of Values within 10 days of the effective date of the Notice to Proceed.

B. Submit corrected Schedule of Values within 10 days upon receipt of reviewed Schedule of Values.

C. At the Engineer's request, submit documentation substantiating the cost allocations for line items within the Schedule of Values.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 SCHEDULE OF VALUES

A. Submit the Schedule of Values in a form acceptable to the Engineer.

B. Provide updated Schedule of Values as required by the Engineer and as indicated in the Contract Documents.

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE

A. The purpose of this section is to provide the framework for communication between the Port and the Contractor by defining the types and timing of administrative tasks, including meetings and other items related to communications.

1.02 NOTICE TO PROCEED

A. Contract execution will be made per the requirements of the Contract Documents. Once the contract has been executed and all pre-work submittals have been received, the Engineer will issue a Notice to Proceed (NTP).

1. In certain instances, the Engineer may issue to the Contractor a Limited NTP for specified elements of the work described in these Contract Documents.

B. The Contractor shall submit all pre-work submittals within 14 days of contract execution.

1. No contract time extension shall be granted for any delays in issuance of the NTP by the Engineer due to the Contractor's failure to provide acceptable submittals required by the Contract Documents.

1.03 SUBMITTALS

A. The Contractor shall submit the following documentation to the Port:

1. For the Contractor and each subcontractor, a list of labor rates for each trade applicable to the scope of work to be performed. These submitted rates shall be broken down to include the base wage, fringes, FICA, SUTA, FUTA, industrial insurance and medical aid premiums as stated in the General Conditions. The rates shall not contain any travel time, safety, loss efficiency factors, overhead or profit. Rates shall be submitted for straight time, overtime and double time in a form acceptable to the Engineer. Contractor shall provide proof of all labor rate costs as required by the Engineer including the submission of a copy of the most current Workers Compensation Rate Notice from Labor & Industries and a copy of the Unemployment Insurance Tax Rate notice from the Employment security department.

a. If labor rates change during the course of the project or additional labor rates become required to complete the work, the Contractor shall submit new rates for approval.

2. Submit for the Contractor and each subcontractor, a list of equipment and rates applicable to the scope of work to be performed. The equipment rates shall conform to the rates shown on Equipment Watch. A separate page from equipment watch detailing the hourly rate shall be submitted as backup documentation for each piece of equipment.

a. If the list of equipment and/or equipment rates changes during the course of the project or additional equipment becomes required to complete the work, the Contractor shall submit a new list and rates for approval.

3. No applications for payment or change orders will be processed for the Contractor until labor and equipment rates have been submitted and approved.

1.04 COORDINATION

A. The Contractor shall coordinate all its activities through the Engineer.

B. The Contractor shall coordinate construction operations as required to execute the Work efficiently, to obtain the best results where installation of one part of the Work depends on other portions.

1.05 PROJECT MEETINGS

A. Pre-Construction Meeting

1. After execution of the contract, but prior to commencement of any work at the site, a mandatory one time meeting will be scheduled by the Engineer to discuss and develop a mutual understanding relative to the administration of the safety program, preparation of the Schedule of Values, change orders, RFI's, submittals, scheduling prosecution of the work. Major subcontractors who will engage in the work shall attend.

2. Location of the Pre-Construction Meeting will be held at the Port of Tacoma Administration Building located at One Sitcum Plaza.

B. Weekly Progress Meetings - Progress meetings include the Contractor, Engineer, consultants and others affected by decisions made.

1. The Engineer will arrange meetings, prepare standard agenda with copies for participants, preside at meetings, record minutes and distribute copies within ten working days to the Contractor, meeting participants, and others affected by decisions made.

2. Attendance is required for the Contractor's job superintendent, major subcontractors and suppliers, Engineer, and representatives of the Port as appropriate to the agenda topics for each meeting.

1.06 CHANGE PROPOSAL REQUESTS

A. Port-Initiated Proposal Requests: The Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Engineer are not instructions either to stop work in progress or to execute the proposed change.

2. Contractor shall submit a written proposal within the time specified in the General Conditions.

B. Contractor-Initiated Proposals: If latent or differing site conditions require modifications to the Contract, the Contractor may initiate a claim by submitting a request for a change to the Engineer.

1. Notify the Engineer immediately upon finding differing conditions prior to disturbing the site.

2. Provide follow-up written notification and differing site conditions proposal within the time frames set forth in the General Conditions.

1.07 CHANGE ORDER PROCEDURES

A. Issuance of Change Order

1. On approval of the Contractor's proposal, and following successful negotiations, the Engineer will issue a Change Order for signature by the Contractor and execution by the Engineer.

a. The Contractor shall sign and return the Change Order to the Engineer within four (4) days following receipt of the Change Order from the Engineer. If the Contractor fails to return the signed Change Order within the allotted time, the Engineer may issue a Unilateral Change Directive.

1.08 PROCEEDING WITH CHANGED WORK

A. The Engineer may issue a directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The directive will contain a description of change in the Work and a not-to exceed amount. It will designate the method to be followed to determine the change in the Contract Sum or the Contract Time.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. The Port and Contractor shall use the Port Contract Management application (e-Builder®) for electronic information exchange throughout the duration of the Contract, as later described.

1. e-Builder® is a web-based application accessed via the web.

2. The Contractor will receive up to two separate user accounts for access to e-Builder®.

3. The joint use of this system is to facilitate and coordinate the electronic exchange of Requests for Information, Submittals, Change Order Proposals, Pay Applications, and project specific correspondence.

1.02 USER ACCESS LIMITATIONS

A. Contractor's access to e-Builder® is granted and controlled by the Engineer.

1. The users assigned by the Contractor to use e-Builder® shall be competent and experienced with the practices commonly employed in the industry for electronically submitting requests for information, submittals, product data, shop drawings and related items as required by the contract and the methods commonly used for project correspondence transmission and filing.

2. Any users assigned by the Contractor whom the Engineer determines is incapable of performing the prescribed tasks in an accurate, competent and efficient manner will be removed upon request from the Engineer. The qualifications and identity of a replacement user shall be submitted within 24 hours for consideration by the Engineer. Once accepted by the Engineer, the user account will be modified accordingly.

1.03 CONTRACTOR TECHNOLOGY REQUIREMENTS

A. The Contractor is responsible for providing and maintaining web enabled devices capable of running the desktop version of the e-Builder® website effectively.

1.04 CONTRACTOR SOFTWARE REQUIREMENTS

A. The Contractor is responsible for providing and maintaining the following:

1. An office suite that is Microsoft Office 2013 compatible for generation and manipulation of correspondence.

2. A program capable of editing, annotating and manipulating Adobe pdf files for inserting the Contractor's review stamp, clouding and adding notation to the files as necessary for review by the Engineer.

1.05 CONTRACTOR RESPONSIBILITY

A. Provide all the equipment, internet connections, software, personnel and expertise required to support the use of e-Builder® as described in the Contract documents.

1.06 PORT RESPONSIBILITY

A. Provide the Contractor with the following:

1. All forms necessary for application to obtain permissions to access e-Builder® as described above.

2. Information, basic user guides and requirements on methods for using e-Builder®.

3. Instruction for the Contractor's staff utilizing e-Builder®.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 UTILIZATION OF E-BUILDER®

A. The Contractor shall provide required information in a timely manner that also supports the project schedule and meets the requirements of the Contract.

B. The Contractor shall provide and maintain competent and qualified personnel to perform the various tasks required to support the work within e-Builder®.

C. The Port will not be liable for any delays associated from the usage of e-Builder® including, but not limited to: slow response time, Port maintenance and off-line periods, connectivity problems or loss of information. Under no circumstances shall the usage of e-Builder® software be grounds for a time extension or cost adjustment to the contract.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This section includes the requirements to provide a preliminary schedule and construction progress schedule, bar chart type.

1.02 SUBMITTALS

A. Within 10 days following execution of the contract, submit a baseline project schedule defining planned operations.

B. If the baseline project schedule requires revision after review, submit revised baseline project schedule within 10 days.

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

D. Submit updated progress schedule monthly to the Engineer with each pay application as required in Section 01 20 00 Price and Payment Procedures.

1.03 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or Consultant specializing in Critical Path Method (CPM) scheduling with one year’s 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.

1.04 SCHEDULE FORMAT

A. The baseline project schedule shall be produced using the CPM format.

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

C. Sheet Size: Multiples of 11 x 17 (280 x 432 mm).

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 BASELINE SCHEDULE

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

B. The baseline project schedule shall include all the activities listed in the Schedule of Values and be directly related to items listed in the Bid Form. The Contractor is encouraged to add sufficient activities to facilitate a clear understanding of the means and methods planned for the various work items.

C. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction and critical path. At a minimum it shall include and show the following:

1. A time scale showing the elementary work items needed to complete the work;

2. Estimated time durations for each activity, defined as any single identifiable work step within the project;

3. A graphical network diagram showing the logical sequence of activities, their precedence relationships, and estimated float or leeway available for each;

4. The different categories of work as distinguished by crew requirements, equipment requirements, and construction materials; and
5. The different areas of responsibility, such as distinctly separate or subcontracted work, and identifiable subdivisions of work.

D. It shall be maintained and updated as necessary to accurately reflect past progress and the most probable future progress.

E. Activities shown shall include submittals, milestones, and sufficient task breakdown for major components of work.

F. Identify work of separate stages and other logically grouped activities.

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

H. Provide separate schedule of submittal dates for shop drawings, product data, samples, owner-furnished products, products identified, and dates reviewed submittals will be required from the Engineer. Indicate decision dates for selection of finishes.

3.02 PROGRESS SCHEDULE

A. From the regularly-maintained baseline project schedule, progress schedules showing a three-week look-ahead, one-week look-back, shall be submitted and distributed at the weekly progress meetings. The progress schedule shall represent a practical plan to complete the work shown within the contract work window presented. At a minimum, the presentation, typically a Gantt-style chart, shall convey the task durations, a logical work sequence, task interdependencies, and identify important or critical constraints.

B. Submittal and distribution of progress schedules will be understood to be the Contractor's representation that the scheduled work meets the requirements of the contract documents and that the work will be executed in the manner and sequence presented, and over the durations indicated.

C. The scheduling, coordination, and execution of construction in accordance with the contract documents are the responsibility of the Contractor. The Contractor shall involve, coordinate, and resolve scheduling with all subcontractors, material suppliers, or others affected in development of the progress schedules.

D. The progress schedule shall be used for coordination purposes for inspection and testing purposes as well as validation of work progress against the baseline schedule.

3.03 UPDATING SCHEDULE

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

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

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

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

E. Submit reports required to support recommended changes.

F. Contractor shall submit an updated progress schedule with each pay application and include a written narrative describing the overall progress of the work. The narrative shall include the following key aspects:

1. Progress in the last period.
2. Critical Path progress and schedule concerns.
3. Changes to schedule logic or sequencing of the work.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the requirements to provide a submittal log and project submittals.

1.02 SUBMITTAL LOG

A. Contractor shall, within 14 days of contract execution prepare and submit for Engineer approval a detailed log of all the submittals required under this Contract, along with any other submittals identified by the Port or Contractor. The log shall include, but not be limited to, schedules, required construction Work plans, equipment and material cut sheets, shop drawings, project record documents, test results, survey records, record drawings, results of QC testing, and all other items for which a submittal is required. The submittal log shall be organized by CSI Specification Division, and Section number and include the following information:

1. Item Description
2. Category
3. Specification Section information of the applicable section
4. After the submittal log is reviewed and approved by the Engineer, it shall become the basis for the submittal of all items by Contractor.

1.03 COMPLIANCE

A. Failure to comply with these requirements shall be deemed as the Contractor's agreement to furnish the exact materials specified or materials selected by the Engineer based on these specifications.

1.04 SHOP DRAWINGS AND MANUFACTURERS' LITERATURE

A. The Port will not accept shop drawings that prohibit the Port from making copies for its own use.

B. Shop drawings shall be prepared accurately and to a scale sufficiently large to indicate all pertinent features of the products and the method of fabrication, connection, erection, or assembly with respect to the Work.

C. All drawings submitted to the Engineer for approval shall be drawn to scale as ANSI D.

D. Required electronic formats for these drawings are as follows:

1. AutoCad DWG
2. PDF - Formatted to print to half-scale using 11x17 paper

E. Catalog cuts or brochures shall show the type, size, ratings, style, color, manufacturer, and catalog number of each item and be complete enough to provide for positive and rapid identification in the field. General catalogs or partial lists will not be accepted. Manufacturers' original electronic files are required for submitting.

1.05 SUBMITTAL REVIEW

A. After review of each of Contractor's submittals, the submittal will be returned to Contractor with a form indicating one or more of the following:

1. No Exceptions Taken - Means, accepted subject to its compatibility with future submittals and additional partial submittals for portions of the work not covered in this submittal. But it does not constitute approval or deletion of specified or required items not shown in the partial submittal.

2. Make Corrections Noted - Same as Item 1, except that minor corrections as noted shall be made by Contractor.
3. Reviewed - Submittal has been reviewed by the Port, does not constitute approval, and the Contractor is responsible for requirements in submittal.
4. Review as Noted - Submittal has to be reviewed by the Port with comments as noted.
5. Revise and Resubmit - Means, rejected because of major inconsistencies or errors. Resolve or correct before next submittal.
6. Rejected - Means, submitted material does not conform to the Contract Documents in a major respect (e.g., wrong material, size, capacity, model, etc.).

B. Submittals marked "No Exceptions Taken," "Make Corrections Noted," or “Reviewed as Noted” authorizes Contractor to proceed with construction covered by those data sheets or shop drawings with corrections, if any, incorporated.

C. When submittals or prints of shop drawings have been marked "Revise and Resubmit" or "Rejected," Contractor shall make the necessary corrections and submit required copies. Every revision shall be shown by number, date, and subject in a revision block, and each revised shop drawing shall have its latest revision numbers and items clearly indicated by clouding around the revised areas on the shop drawing.

D. Submittals authorized by the Engineer do not in any case supersede the Contract Documents. The approval by the Engineer shall not relieve the Contractor from responsibility to conform to the Drawings or Specifications, or correct details when in error, or ensure the proper fit of parts when installed. A favorable review by the Port of shop drawings, method of work, or information regarding material and equipment Contractor proposes to furnish shall not relieve Contractor of its responsibility for errors therein and shall not be regarded as assumption of risk or liability by the Port or its officers, employees, or representatives. Contractor shall have no claim under the Contract on account of failure or partial failure, or inefficiency or insufficiency of any plan or method of work, or material and equipment so accepted. Favorable review means that the Port has no objection to Contractor using, upon its own full responsibility, the plan or method of work proposed, or furnishing the material and equipment proposed.

E. It is considered reasonable that the Contractor’s submittals shall be complete and acceptable by at least the second submission of each submittal. The Port reserves the right to deduct monies from payments due Contractor to cover additional costs for review beyond the second submission.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 PREPARATION OF SUBMITTALS

A. The Contractor shall submit all shop drawings, catalog cuts, brochures and physical samples using e-Builder® (a web based construction management software). All post-document-generated notations such as notes, arrows, stamps, clouding, or other items, are required to be shown directly on the submittal document. **Each submittal shall be accompanied by a transmittal developed within the e-Builder® software.**

B. A separate submittal shall be prepared for each product or procedure and shall be further identified by referencing the Specification Section and paragraph number and each submittal shall be numbered consecutively.

C. Product submittals that cannot be accomplished electronically shall be submitted electronically without attachments, marked as being hand delivered, and accompanied by a printed version of a transmittal.

D. Shop and detail drawings shall be submitted in related packages. All equipment or material details which are interdependent, or are related in any way, must be submitted indicating the complete installation. Submittals shall not be altered once marked “No Exceptions Taken” Revisions shall be clearly marked and dated. Major revisions must be submitted for approval.

E. The Contractor shall thoroughly review all shop and detail drawings, prior to submittal, to assure coordination with other parts of the work.

F. Components or materials which require shop drawings and which arrive at the job site prior to approval of shop drawings shall be considered as not being made for this project and shall be subject to rejection and removal from the premises.

G. All submittal packages including, but not limited to, product data sheets, mix designs, shop drawings and other required information for submittal must be submitted, reviewed and approved before the relevant scheduled task may commence. It is the responsibility of the Contractor to provide the submittal information which may drive a task on the construction schedule to submit items well enough in advance as to provide adequate time for review and comment from the Engineer without adversely impacting the construction schedule.

H. When completing the e-Builder® submittal form, a Date Due field is required to be completed. This field is intended to inform the Port of the urgency of the submittal. Failure of the Port to return the submittal by the date provided by the Contractor will not be considered grounds for a contract time extension.

3.02 PRE-WORK SUBMITTALS

A. Prior to issuance of Notice to Proceed, the following submittals must be submitted and returned to the Contractor as No Exceptions Taken, Make Corrections Noted, Reviewed, or Reviewed as Noted.

1. Per 00 72 00 and 01 32 16, Baseline Project Schedule
2. Per 00 73 63, Emergency Contact Numbers
3. Per 01 35 29, Health and Safety Plan (HASP)
4. Per 01 35 29, Spill Prevention and Countermeasures Plan (SPCC)
5. Per 01 35 47, List of equipment and written certification

3.03 MAINTENANCE OF SUBMITTAL LOG

A. Prepare and submit for Port review a detailed submittal log conforming to the requirements of paragraph 1.02 of this section. When approved by the Engineer, use the submittal log to track the transmittal of submittals to the Engineer, the receipt of submittal comments from the Engineer, and all subsequent action with respect to each submittal. Provide an updated copy of the submittal log to the Engineer during each weekly progress meeting, unless otherwise approved by the Engineer.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. The work includes the requirements for health and safety provisions necessary for all work at the site for this project. The work also includes compliance with all laws, regulations and ordinances with respect to safety, noise, dust, fire and police action, civil disobedience, security or traffic.

B. Some of the work tasks may place workers in the potential position of coming into contact with regulated building materials, waste, or environmental media. Detailed information regarding the known nature and extent of refuse and regulated materials in the project area is included in Section 00 31 26 Existing Hazardous Material Information.

C. The Contractor shall monitor site conditions for indications of identified and other potentially hazardous, dangerous, and/or regulated materials (suspicious material). Indicators of suspicious material include, but are not limited to, refuse, oily sheen or coloring on soil or water, or oily or chemical odors. If suspicious materials are encountered, the Contractor shall stop all work in that area and notify the Engineer immediately.

D. Landfill have the potential to create hazardous conditions if not controlled or recognized. Some of the hazards include:

1. Fires that may start spontaneously from exposed and/or decomposed refuse.
2. Fires and explosions that may occur from the presence of methane gas.
3. Landfill gases and other trace gases may cause an oxygen deficiency in confined spaces such as trenches, vaults, conduits, and structures.
4. Hydrogen sulfide, a highly toxic and flammable gas, and/or other toxic gases may be present.
5. Possible caving of trenches and excavations when working over or in refuse fills.

E. The Contractor is alerted to the presence of odorous conditions during excavation and stockpiling of materials due to hydrogen sulfide and possibly other odorous gases. Section 00 31 26 Existing Hazardous Material Information describes odorous conditions encountered during site investigations. The Contractor shall take appropriate health and safety measures to assess concentrations of these gases, and mitigate as required. Mitigation measures shall include the use of personal protective equipment, if required.

1.02 SUBMITTALS

A. Prior to Notice to Proceed, the Contractor shall provide a site specific Health and Safety Plan (HASP), which meets all the requirements of local, state and federal laws, rules and regulations. The HASP shall address all requirements for general health and safety and shall include, but not be limited to:

1. Description of work to be performed and anticipated chemical and/or physical hazards associated with the work;
2. Map of the site(s) illustrating the location of the anticipated hazards and areas of control for those hazards (including containments, exclusion/work zones, and contaminant reduction/decontamination zones);
3. Hazardous material inventory and safety data sheets (SDSs) for all chemicals which will be brought on site;

4. Signage appropriate to warn site personnel and visitors of anticipated site hazards;
5. Documentation that the necessary workers have completed the required Hazardous Waste Operations and Emergency Response (HAZWOPER) training;
6. Engineering controls/equipment to be used to protect against anticipated hazards;
7. Personal protective equipment and clothing including head, foot, skin, eye, and respiratory protection;
8. Procedures which will be used for:
    a. Lockout/Tagout,
    b. Fall protection,
    c. Trenching and shoring,
    d. Hot work,
    e. Explosive conditions due to methane,
    f. Oxygen deficient conditions,
    g. Asbestos and lead hazards,
    h. Suspicious materials and/or unidentified materials,
    i. Confined-space entry (could include dewatering storage tanks, manholes, or other items),
    j. Confined-space rescue, and
    k. Odorous conditions and toxic gases;
9. Exposure monitoring to be used to evaluate actual hazards compared with anticipated conditions, including but not limited to arsenic exposure assessment;
10. Site housekeeping procedures and personal hygiene practices;
11. Personnel and equipment decontamination plan;
12. Administrative controls;
13. Emergency plan including locations of and route to nearest hospital;
14. Medical surveillance program for site personnel before, during, and after completion of site work;
15. Recordkeeping including:
    a. Documentation of appropriate employee training (e.g., Hazardous Waste Operations and Emergency Response [HAZWOPER] 40-hour training for staff involved with excavation and handling of soil),
    b. Respirator fit testing, and
    c. Arsenic exposure assessment results;
16. Name and qualification of person preparing the HASP and person designated to implement and enforce the HASP;
17. Name and qualifications for Certified Safety Professional (CSP) or Certified Industrial Hygienist (CIH) and a copy of the CIH's or CSP's certification and resume;

18. Excavation, stockpiling, and truck loading procedures;
19. Lighting and sanitation; and
20. Signatory page for site personnel to acknowledge receipt, understanding, and agreement to comply with the HASP.

B. Prior to the start of any Work, the Contractor shall provide a site specific Spill Prevention, Control and Countermeasures (SPCC) Plan, which meets all the requirements of local, state and federal laws, rules and regulations.

C. Contractor may submit the HASP and SPCC Plan as one comprehensive document or may submit the plans as separate documents.

D. The Contractor shall include in the HASP recent requirements associated with the State's COVID-19 Job Site Requirements as noted at in the Appendix or online at https://www.governor.wa.gov/sites/default/files/Phase%201%20Construction%20COVID-19%20Safety%20Requirements%20%28final%29.pdf.

1.03 POTENTIAL CHEMICAL HAZARDS

A. Site Contaminants

1. The Contractor must provide site workers with Hazard Communication standard information for potential site contaminants (in accordance with WAC 296-843). The Contractor shall ensure that all site workers are aware of and understand this information. Additional information shall also be provided by the Contractor, as necessary, to meet the Hazard Communication Standard and HASP requirements as noted in WAC 296-901-14010 and 296-843. Workers shall be instructed on basic methods or techniques to assist in detecting suspicious material.
2. The Project soils, in many areas, contain greater than 20 ppm of inorganic arsenic and the Contractor shall comply with all applicable requirements of Washington Department of Labor and Industries Division of Occupational Safety and Health (DOSH) Arsenic Standard, WAC 296-848 including but not limited to personal exposure monitoring, use of respirators and PPE, and worker training. Refer to WAC 296-848-100 Table 1 to determine applicable sections. Arsenic remnant soils are present throughout the site.

B. Potential Exposures Routes

1. Inhalation: Airborne dusts, fibers, particulates, or vapors may be released during site activities. Inhalation of airborne inorganic arsenic may occur.
2. Skin and Eye Contact: Dusts generated during site work activities may settle on the skin or clothing of site workers. Also, workers may contact potentially regulated sediments, or water, in the normal course of their work. Precautions to prevent skin or eye contact with hazardous materials will be included in the HASP. Arsenic exposure may cause skin irritation.
3. Ingestion: Inadvertent transfer of site contaminants from hands or other objects to the mouth could occur if site workers eat, drink, smoke, chew tobacco, or engage in similar activities in work areas. This could result in ingestion of site contaminants. Precautions to prevent accidental or inadvertent ingestion of hazardous materials will be included in the HASP.

C. Chemical hazards may also result from Contractor operations resulting in inadvertent release of fuel, oil, or other chemicals in a manner that would expose workers.

1.04 POTENTIAL PHYSICAL AND OTHER HAZARDS

A. The Work of the Contractor is described elsewhere in these specifications. Precautions to prevent all anticipated physical and other hazards, including heavy equipment and vessels, shall be addressed in the HASP.

B. Specific aspects of construction resulting in physical hazards anticipated for this project include, but are not limited to the following:

1. Major hazards associated with earthwork impacts from moving construction vehicles and trucks, noise, thermal stress, contact with unguarded machines, excavation hazards (i.e., cave-in, utility, etc.), strains from heavy lifting, and reduced visibility and communications difficulties in work area; and

2. Operation of equipment, including excavators, loaders, and related equipment, presenting hazards of entrapment, ensnarement, and being struck by moving parts.

C. Other anticipated physical hazards:

1. Heat stress, such as that potentially caused by impermeable clothing (may reduce the cooling ability of the body due to evaporation reduction);

2. Cold stress, such as that potentially caused during times when temperatures are low, winds are high, especially when precipitation occurs during these conditions;

3. Biological hazards, such as mold, insect stings, or bites, poisonous plants (i.e., poison oak, sumac, etc.); and

4. Trips and falls.

D. Firewatch Procedures

1. A firewatch is implemented to ensure the fire-safety of a building, structure or area in the event of any act (e.g., hot work) or situation instigating an increased risk of fire. The term "firewatch" is used to describe a dedicated person or persons whose sole responsibility is to look for fires within an established area.

2. A firewatch is required when all hot work is being performed.

3. The firewatch is to perform the following functions:

a. Firewatch personnel are to keep diligent watch for fires in the general area where the work is being performed.

b. Firewatch personnel are to be familiar with facilities and procedures for sounding an alarm in the event of a fire.

c. Firewatch personnel are to have fire extinguishing equipment readily available and be trained in its use, including practice on test fires.

d. Firewatch personnel are to inspect the site prior to hot work activities to ensure that combustibles are removed or covered and that any nearby holes or penetrations in the ground and walls are sealed or covered with fire-safe materials.

e. Firewatch personnel are to watch for fires in all exposed areas. If a fire is located, firewatch personnel are to sound the evacuation alarm immediately and after that try to extinguish the fire, only when obviously within the capacity of the equipment available.

f. The firewatch is to be maintained for at least 120 minutes after completion of hot work such as cutting, welding, or other open flame operations, in order to detect and extinguish smoldering and flaming fires. During this time, the work area and other adjacent areas where sparks or flame may have traveled are to be searched for signs of combustion.

PART 2 - PRODUCTS

2.01 SAFETY SIGNAGE

A. The Contractor shall provide signage at strategic locations within the project site to alert jobsite workers and visitors of the remediation work, associated hazards, and required precautions.

2.02 PRODUCTS SPECIFIED FOR HEALTH AND SAFETY

A. Provide the equipment and supplies necessary to support the work as described in the site-specific HASP. Equipment and supplies may include, but are not limited to:

1. All chemicals to be used on site;
2. A hazardous materials inventory and SDSs for the chemicals brought on site;
3. Enclosure equipment (for dust and asbestos fiber control);
4. Fencing and barriers;
5. Warning signs and labels;
6. Trenching equipment;
7. Fire extinguishers;
8. Equipment to support hot work;
9. Equipment to support lockout/tagout procedures;
10. Scaffolding and fall protection equipment;
11. Personal protective equipment (hard hats, foot gear, skin, eye, and respiratory protection);
12. Area and personnel exposure monitoring equipment;
13. Demolition equipment and supplies;
14. Decontamination equipment and supplies;
15. First aid equipment;
16. Spill response and spill prevention equipment; and
17. Field documentation logs/supplies.

PART 3 - EXECUTION

3.01 WORK AREA PREPARATION

A. Contractor shall comply with health and safety rules, regulations, ordinances promulgated by the local, state, and federal government, the various construction permits, and other sections of the Contract Documents. Such compliance shall include, but not be specifically limited to: any and all protective devices, equipment and clothing; guards; restraints; locks; latches; switches; and other safety provisions that may be required or necessitated by state and federal safety regulations. The Contractor shall determine the specific requirements for safety provisions and shall have inspections and reports by the appropriate safety authorities to be conducted to ensure compliance with the intent of the regulations.

B. Contractor shall inform employees, subcontractors and their employees of the potential danger in working with any potentially regulated materials, equipment, soils and groundwater at the project site.

   1. The Contractor shall not proceed with jobsite activities that might result in exposure of employees to hazardous materials, including arsenic, until the HASP is reviewed by the Engineer.

   2. In addition, the Engineer will submit a copy of the Contractor's HASP to Ecology for review. Ecology and the Engineer will review but not approve HASP.

C. All Contractor employees expected to work at the jobsite or individuals entering the jobsite shall read the Contractor HASP before they enter the jobsite, and will sign a statement provided by the Contractor that they have read and understand the HASP. A copy of the Contractor’s HASP shall be readily available at the site at all times the work is being performed.

D. The Contractor’s HASP shall be amended as needed by the CIH or CSP to include special work practices warranted by jobsite conditions actually encountered. Special practices could include provisions for decontamination of personnel and equipment, and the use of special equipment not covered in the initial plan.

E. Contractor shall perform whatever work is necessary for safety and be solely and completely responsible for conditions of the job site, including safety of all persons (including employees of the Engineer, Engineer’s Representative, and Contractor) and property during the Contract period. This requirement applies continuously and is not limited to normal working hours.

F. The Engineer’s review of the Contractor's performance does not include an opinion regarding the adequacy of, or approval of, the Contractor's safety supervisor, the site-specific HASP, safety program or safety measures taken in, on, or near the job site.

G. Accidents causing death, injury, or damage must be reported immediately to the Engineer and the Port Security Department in person or by telephone or messenger. In addition, promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full details and statements of witnesses.

H. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing within 24 hours after occurrence, to the Engineer, giving full details of the claim.

3.02 SITE SAFETY AND HEALTH OFFICER

A. Contractor shall provide a person designated as the Site Safety and Health Officer, who is thoroughly trained in rescue procedures, has a minimum current 40-hour HAZWOPER certification (minimum), and trained to use all necessary safety equipment, air monitoring equipment, and gas detectors. The person must be available and/or present at all times while work is being performed, and conduct testing, as necessary.

B. The Site Safety and Health Officer shall be empowered with the delegated authority to order any person or worker on the project site to follow the safety rules. Failure to observe these rules is sufficient cause for removal of the person or worker(s) from this project.

C. The Site Safety and Health Officer is responsible for determining the extent to which any safety equipment must be utilized, depending on conditions encountered at the site.

3.03 GENERAL SAFETY GUIDELINES FOR HAZARDOUS GASES

A. The generally accepted procedure to protect the worker from the effects of the dangers from hazardous gases is through the use of four safeguard measures:

1. Test the atmosphere: Before entering a trench, underground vault, or any other excavation, the atmosphere shall be tested to detect any adverse environmental conditions with a gas detector instrument. Test instruments shall be properly maintained and calibrated. The test shall be conducted from top to bottom of the excavation or every four (4) feet.

2. Ventilate all confined spaces: Before entry and during the entire time workers are in the confined space. Forced ventilation is the generally accepted procedure.

3. Use appropriate safety equipment: All personnel shall be trained to operate the appropriate safety equipment that are to be utilized during the course of their work. It is the responsibility of the Contractor's Site Safety and Health Officer to ascertain that all safety equipment is being used when appropriate.

4. Provide backup safety personnel: Prior to any personnel entering an excavation or confined space, a separate individual shall be positioned outside the space.

B. Safety Monitoring Instrumentation: The Safety and Health Officer shall have appropriate instruments (detector[s]) to test for oxygen deficiency and for the presence of methane gas, hydrogen sulfide, and/or other known or suspected vapors and gases. The Site Safety and Health Officer shall periodically calibrate the instruments, regularly test the excavation or space areas and other work areas for safe working conditions, and ensure that appropriate safety equipment is available.

3.04 SUPPLEMENTAL SAFETY PROGRAM FOR GASES

A. Supplemental to the Contractor's regular safety program, the Contractor shall develop and institute procedures to inform all workers at the site of the potential for the presence of methane and other landfill gases emanating from the natural decomposition of refuse buried at or near the job site, and the importance of safety precautions to ensure the safety of workers and the public.

B. Recommended Precautions: In addition to conforming to safety rules and regulations of governmental authorities having jurisdiction, the Contractor shall conform to the following minimum precautionary measures:

1. Frequently monitor for all possible hazardous gases, oxygen deficiency and other known or suspected vapors and gases.
2. Prohibit smoking in or near open excavations, exposed refuse, and in the vicinity of underground pipe laying activities. Smoking will be permitted only in those areas designated by the Site Safety and Health Officer.
3. In the event toxic gas is present in sufficient quantities to trigger a gas detection alarm, the Contractor shall immediately evacuate all personnel from the area until determined safe by the Site Safety and Health Officer.
4. Do not use explosives.
5. Do not leave refuse exposed overnight, unless otherwise approved by the Engineer. Any refuse exposed during construction activities shall be covered with at least a 6-inch layer of earth, tarps, or membrane.
6. Do not weld in trenches, enclosed areas, or over refuse unless performed in areas tested and approved by the Site Safety and Health Officer.
7. Construction equipment used in excavation activities and/or refuse removal operations shall be equipped with vertical exhaust and spark arresters.
8. Electric motors utilized in excavation areas and below ground shall be explosion-proof.
9. As construction progresses, all pipe openings and valves shall be closed as soon as installed to prevent the migration of gases through the pipeline system.

C. Suggested Measures: If not already included in the Contractor's standard safety practices, the Contractor shall add the following measures to their safety program:

1. Workers shall be cautioned on the possibility of collapsing excavations during construction operations near and in open excavations particularly in refuse-filled areas. Anyone working near the edge of deep excavations should be secured with a safety belt, harness, or limit line to preclude the possibility of falling into the opening. Refuse filling operations and compaction is quite variable and therefore may not provide the same slope stability as excavations in native soils.
2. Any personnel working near the edge of well excavations or similar construction should wear a harness securely attached to a lanyard. The lanyard shall be made as short as possible and securely fastened to a safe object.
3. Safe and suitable ladders that project 2 feet above the top of the trench shall be provided for all trenches over 4 feet in depth. A minimum of one ladder shall be provided for each 25 feet of open trench, and be so located that workers in the trench need not move more than 25 feet to a ladder.
4. No worker shall be allowed to work alone in an excavation. An individual shall be positioned outside the excavation, but within eyesight of the workers in the excavation, and assist them should an emergency develop.
5. Work upwind of an excavation where possible, unless the excavation is constantly monitored and declared safe.
6. Workers should avoid contact with exposed refuse where possible.
7. No excavation or drilled hole greater than 2 feet deep shall be left unattended or open overnight unless it is securely covered in a manner acceptable to the Engineer.

8. Fire extinguishers with a rating of at least A, B, and C shall be available onsite.
9. Startup and shutdown of equipment shall be avoided in areas of exposed refuse.
10. Personnel in an open excavation or in the presence of landfill gas shall be fully clothed with appropriate personal protection equipment. Workers shall immediately vacate the excavation if gases are detected therein, and shall not be permitted to re-enter the excavation unless satisfactory precautionary measures are implemented.

3.05 SPILL PREVENTION AND CONTROL

A. The Contractor shall be responsible for prevention, containment and cleanup of spilling petroleum and other chemicals/hazardous materials used in the Contractor's operations. All such prevention, containment and cleanup costs shall be borne by the Contractor.

B. The Contractor is advised that discharge of oil, fuel, other petroleum, or any chemicals/hazardous materials from equipment or facilities into state waters or onto adjacent land is not permitted under state water quality regulations.

C. In the event of a discharge of oil, fuel or chemicals/hazardous materials into waters, or onto land with a potential for entry into waters, containment and cleanup efforts shall begin immediately and be completed as soon as possible, taking precedence over normal work. Cleanup shall include proper disposal of all spilled material and used cleanup materials.

D. The Contractor shall, at a minimum, take the following measures regarding spill prevention, containment and cleanup:

1. Fuel hoses, lubrication equipment, hydraulically operated equipment, oil drums and other equipment and facilities shall be inspected regularly for drips, leaks or signs of damage, and shall be maintained and stored properly to prevent spills. Proper security shall be maintained to discourage vandalism.
2. All land-based chemical, oil and products' storage tanks shall be diked, contained and/or located so as to prevent spills from escaping into the water. Dikes and containment area surfaces shall be lined with impervious material to prevent chemicals or oil from seeping through the ground and dikes.
3. All visible floating sheen shall be immediately contained with booms, dikes or other appropriate means and removed from the water prior to discharge into state waters. All visible spills on land shall be immediately contained using dikes, straw bales or other appropriate means and removed using sand, sawdust or other absorbent material, which shall be properly disposed of by the Contractor. Waste materials shall be temporarily stored in drums or other leak-proof containers after cleanup and during transport to disposal. Waste materials shall be disposed offsite in accordance with applicable local, state and federal regulations.
4. In the event of any oil or product discharges into public waters, or onto land with a potential for entry into public waters, the Contractor shall immediately notify the Port Security at their listed 24-hour response number:
    a. Port Security: 253-383-9472

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This Section discloses procedures to follow if unknown regulated materials are encountered.

1.02 NOTIFICATION AND SUSPENSION

A. In the event the Contractor detects the presence of potentially regulated materials not previously identified in this specification, the Contractor shall stop work and immediately notify the Port. Following such notification by the Contractor, the Port shall in turn notify the various governmental and regulatory agencies concerned with the presence of regulated materials, if warranted. Depending upon the type of materials identified, the Port may suspend work in the vicinity of the discovery under the provisions of General Conditions.

1. Following completion of any further testing necessary to determine the nature of the materials involved, the Port will determine how the material shall be managed. Although the actual procedures used in resuming the work shall depend upon the nature and extent of the regulated material, the following alternate methods of operation are foreseen as possible:

a. Contractor to resume work as before the suspension.

b. Contractor to move its operations to another portion of the work until measures to eliminate any hazardous conditions can be developed and approved by the appropriate regulatory agencies.

c. The Port to direct the Contractor to dispose or treat the material in an approved manner.

d. The Port to terminate or modify the Contract accordingly, for unforeseen conditions.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. Soils that cannot be reused onsite and are anticipated to be exported to an off-site facility must have a completed soil profile prior to export. The Port will conduct testing of material as defined further in this specification. The Contractor is responsible for any additional testing necessary to satisfy requirements of the Contractor's receiving facility.

B. Soils excavated within the project area, as shown on the drawings, are anticipated to be free of regulated material; however, should the Contractor identify soil that cannot be reused as part of the project, the Contractor shall notify the Engineer to determine if the soil requires special handling.

1. Soil with unexpected regulated material, as identified by visual and/or olfactory methods, shall be segregated from other excavated material until such time as appropriate testing and analysis can be completed by the Port. Upon completion of the soil profile, the Engineer will inform the Contractor of any special handling requirements based on the results.

2. Soil beyond construction excavation limits will not require excavation unless free draining product is observed or other special conditions exist; in which case the Engineer will direct the Contractor in additional excavation. Soils determined to require special handling will be hauled and disposed of at an approved disposal facility.

C. No soil shall be removed from the site without prior notification to the Engineer. The notification shall include:

1. An estimate of the number of truck-trips, the haul destination, and the period in which these trips will be made (e.g., 20 truck-trips to the Waste Management Facility over the two-week period beginning on March 1, 2012).

1.02 DEFINITIONS

A. Olfactory Indications (methods): Of or relating to the sense of smell. Soils containing petroleum and other volatile constituents typically exhibit characteristic odors that can be detected (and sometimes identified) by smell.

B. Regulated Material: Any chemical, physical, biological, or radiological substance that does not occur naturally in the environment, or that occurs at concentrations higher than natural background levels, and is regulated by agencies as to the disposal/recycling facility(ies) the material can and cannot go (i.e., EPA, Department of Ecology, Tacoma-Pierce County Health Department).

C. Soil (waste) Profile: A characterization of the chemical and physical properties of soil material designated for off-site disposal, including the presence of pollutants and their concentrations as measured by approved laboratory analytical methods. A profile is required by the receiving permitted disposal or recycling facility.

D. Special Handling: Refers to hauling and disposal of soils that cannot be reused in place as backfill or as general fill at another (off-site) location due to the presence of pollutants in concentrations above allowable limits. Such soils must be hauled to and managed at a permitted disposal facility.

E. Type A Regulated Soil: Soil that must be removed from the Project site and has been determined by the Engineer to contain pollutants in concentrations that exceed state or federal dangerous or hazardous designations (respectively), or other special Port-determined criteria. Type A Regulated Soil requires disposal at an approved Subtitle C hazardous waste landfill.

F. Type B Regulated Soil: Soil that must be removed from the Project site and has been determined by the Engineer to contain pollutants in concentrations that are below dangerous or hazardous levels, but could negatively impact the quality of air, waters of the state, soils or sediments, or pose a threat to the health of humans or other living organisms, depending on where the soil is disposed. Type B Regulated Soil requires disposal an approved Subtitle D solid waste landfill.

G. Type C Regulated Soil: Soil that must be removed from the Project site and has been determined by Engineer to contain unknown constituent(s) and/or in unknown concentration(s) and requires further analysis and characterization. Type C Regulated soil will require disposal at an approved Subtitle C hazardous waste landfill or Subtitle D solid waste landfill if additional soil characterization indicates special handling is required.

H. Type D Soil: Soil determined by the Engineer not to require special handling with regard to this Contract. Classification of material as Type D Soil by the Port is not a certification nor does it release the Contractor of liability or obligation to meet any disposal or storage facility acceptance or testing requirements.

I. Unexpected Regulated Material: Regulated material unexpectedly found in an excavation or in other locations where there is no prior knowledge, information, or history to indicate possible spills or releases of regulated material.

J. Visual Indications (methods): A preliminary evaluation of the potential presence of contamination based on visual observation. For example, soils containing petroleum are frequently discolored or stained relative to non-petroleum impacted native soils or clean fill.

1.03 HEALTH AND SAFETY

A. The Contractor is required to implement all health and safety provisions as required by Specification 01 35 29 – Health, Safety and Emergency Response. These provisions include any special monitoring, personal protective equipment, or work plans to accommodate regulated soil or material special handling. Use of environmental characterization data may not be appropriate for health and safety purposes.

1.04 SUBMITTALS

A. Prior to excavation of any subsurface materials, the Contractor shall submit a Soils Management Plan to the Engineer. The Soils Management Plan must be approved by the Engineer prior to any excavation of subsurface materials. The Soils Management Plan must include the following:

1. Identification of all soil disposal facilities anticipated to be used for soils that are determined to be Type A or Type B Regulated Soil.

2. Identification of all fill sites, disposal/recycling facilities and/or end uses anticipated to be used for soil determined to be Type D Soil in accordance with paragraph 3.02 of this section.

3. Contingency for delivery and placement of Type C Regulated Soil at an on-site soil stockpile area.

4. Contingency for managing soil/debris encountered during excavation that may disqualify soil for disposal or recycle at the anticipated facilities.
5. General description of how equipment operators, safety staff and other applicable on-site personnel will identify and respond to soil containing potentially regulated material.
6. Contractor shall coordinate with the Engineer to facilitate handling of regulated soil in accordance with this specification.
7. Description of all haul routes to be used on the project.

B. A completed soil profile prior to export to an off-site receiving facility.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 EXCAVATION/TESTING

A. The field-testing for soil to be exported offsite will be performed by the Port and will result in the following classification of material:
   1. Type A Regulated Soil as defined in 1.02(E) of this Section
   2. Type B Regulated Soil as defined in 1.02(F) of this Section
   3. Type C Regulated Soil as defined in 1.02(G) of this Section
   4. Type D Soil as defined in 1.02(H) of this Section

B. Contractor shall give Port no less than one week notice for sampling export soil prior to disposal offsite. Contractor shall anticipate at least two weeks for lab results.

C. Laboratory turnaround times may require additional time for analytical results; therefore, Contractor should coordinate with Engineer well in advance of anticipated disposal date. Samples that are required to have “rush” analysis performed due to the Contractor’s failure to disclose the anticipated disposal date shall have the difference in service fees paid by the Contractor, or the Contractor may delay the disposal until the standard analysis turnaround time is complete, at no additional cost to the Port.

3.02 TRANSPORTATION AND OFF-SITE DISPOSAL OF SOILS

A. The Contractor shall be responsible for handling, re-handling, loading, transporting, and legal off-site removal of all waste materials and excavated soils not reused onsite.
   1. Contractor shall ensure that transport truck gross weight meets federal and/or state Department of Transportation (DOT) requirements and the requirements of the receiving facility, whichever is more stringent.
   2. Contractor shall take measures to prevent debris from being spilled from trucks or tracked from the site to local streets. Contractor shall sweep streets adjacent to the site as necessary or as directed by the Engineer.
   3. Contractor shall ensure that any vehicle transporting materials offsite are properly labeled and placarded in accordance with federal and state DOT requirements.

B. Type A Regulated and Type B Regulated Soil shall be hauled to an approved facility by the Contractor for disposal.

C. Type C Regulated Soil is of unknown origin or special circumstances. Type C Regulated Soil shall be hauled to an on-site segregated stockpile area. The Contractor shall protect the material from weather and other disturbances once stockpiled. The Port will inform the Contractor of the soil profile following additional analysis of the suspect material (as needed), and the soil will be categorized as either Type A Regulated, Type B Regulated or Type D Soil and disposed of accordingly.

D. Type D Soil that is not reused onsite shall be hauled by the Contractor to a site determined by the Contractor. If the receiving/disposal facility requires additional testing or certification of this soil, Contractor shall complete these requirements, at no additional cost to the Port. The Port will not certify or declare the material suitable for unrestricted use.

3.03 OTHER REQUIREMENTS

A. Type A, Type B or Type C Regulated Soil may be, upon approval of the Engineer, temporarily stockpiled within the construction area. Contractor shall place an impervious liner beneath the soil and securely cover the stockpile with waterproof covering (e.g., plastic sheeting). Additional measures (e.g., berm, jersey barriers, silt fence, etc.) may be required to minimize soil runoff from the stockpile area. The soil shall be removed prior to completion of Work.

B. Contractor shall provide the Engineer with all hauling receipts (or copies of receipts) from the disposal facility for all Type A, Type B or Type C Regulated Soil at least weekly.

C. The Engineer may shut down excavation activities should unexpected regulated material be encountered during excavation.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. The Work includes the requirements to provide air and noise control measures until Final Completion of the Work.

1.02 SUBMITTALS

A. Prior to Notice to Proceed, the Contractor shall submit a list of equipment to be used on the project and written certification that all equipment on the list and any additional equipment, including Contractor's, subcontractors or supplier's equipment, shall meet the requirements of 3.01 below.

PART 2 - PRODUCTS - NOT USED

PART 3 – EXECUTION

3.01 AIR POLLUTION CONTROL

A. The Contractor shall meet or exceed EPA Tier 2 off-road diesel engine emission standards for off-road equipment >= 25hp and meet or exceed EPA 1994 on-road diesel engine emission standards for on-road equipment except as follows:

1. Equipment being used in an emergency or public safety capacity

B. The Contractor shall not discharge smoke, dust, and other hazardous materials into the atmosphere that violate local, state or federal regulations.

C. No vehicles can idle for more than 5 consecutive minutes, except as follows:

1. Idling is required to bring or maintain the equipment to operating temperature;
2. Engine idling is necessary to accomplish work for which the equipment was designed (i.e. operating a crane); or
3. Idling vehicles being used in an emergency or public safety capacity.

D. The Contractor shall minimize nuisance dust by cleaning, sweeping, vacuum sweeping, sprinkling with water, or other means. Equipment for this operation shall be on the job site or available at all times.

3.02 NOISE CONTROL

A. The Contractor shall comply with all local controls and noise level rules, regulations and ordinances which apply to work performed pursuant to the Contract.

B. All internal combustion engines used on the job shall be equipped with a muffler of a type recommended by the manufacturer.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 VARIATIONS WITH CODES, REGULATIONS AND STANDARDS

A. Nothing in the Drawings and specifications permits Work not conforming to codes, permits, or regulations. Promptly submit written notice to the Engineer of observed variations or discrepancies between the Contract Documents and governing codes and regulations.

B. Appropriate modifications to the Contract Documents will be made by Change Order to incorporate changes to Work resulting from code and/or regulatory requirements. Contractor assumes responsibility for Work contrary to such requirements if Work proceeds without notice.

C. Contractor is not relieved from complying with requirements of Contract Documents which may exceed, but not conflict with requirements of governing codes.

1.02 COORDINATION WITH REGULATORY AGENCIES

A. Coordinate Work with appropriate governing or regulating authorities and agencies.

B. Provide advance notification to proper officials of Project schedule and schedule revisions throughout Project duration, in order to allow proper scheduling of inspection visits at proper stages of Work completion.

C. Regulation coordination is in addition to inspections conducted by Engineer. Notify Engineer at least 48 hours in advance of scheduled inspections involving outside regulating officials, to allow Engineer to be present for inspections.

PART 2 - PRODUCTS - NOT USED

PART 3 – EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes requirements relating to referenced standards.

1.02 QUALITY ASSURANCE

A. For products or 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. Conform to reference standard of date of issue specified in this section, except where a specific date is established by applicable code.

C. Should specified reference standards conflict with Contract Documents, request clarification from the Engineer before proceeding.

D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 QUALITY CONTROL FOR COMPLIANCE:

A. The Contractor shall perform such detailed examination, inspection, quality control and assurance of the Work as to ensure that the Work is progressing and is being completed in strict accordance with the Contract Documents. The Contractor shall plan and lay out all Work in advance of operations so as to coordinate all Work without delay or revision. The Contractor shall be responsible for inspection of portions of the Work already performed to determine that such portions are in proper condition to receive subsequent Work. Under no conditions shall a portion of Work proceed prior to preparatory work having been satisfactorily completed. The Contractor shall ensure that the responsible Subcontractor has carefully examined all preparatory work and has notified the Contractor (who shall promptly notify the Port in writing) of any defects or imperfections in preparatory work that will, in any way, affect completion of the Work.

1.02 QUALITY ASSURANCE - 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 Engineer 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. Perform Work 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, or disfigurement.

1.03 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 Engineer before proceeding.

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

1.04 MANUFACTURER'S 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 equipment, test, and adjust and balance equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Engineer.

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

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes requirements relating to the following:

1. Temporary telecommunications services
2. Temporary Controls: Barriers, enclosures, and fencing
3. Vehicular Access and Parking

1.02 TELECOMMUNICATIONS SERVICES

A. Provide, maintain, and pay for telecommunications services as required for project purposes. It is the Contractor’s responsibility to be able to receive phone calls and emails at the job site.

1.03 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 Port'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 and for public access to existing building.

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

1.04 TREE AND VEGETATION PROTECTION

A. The Contractor shall carefully protect existing trees and vegetation noted to remain from damage by construction activities.

B. All trees and vegetation noted to remain shall have 4’ high, high visibility fence installed at the drip line of the tree or vegetation or as noted and shown on the Drawings.

C. If a tree or vegetation designated for protection is damaged or destroyed in the course of the Work, the Contractor shall replace it with new comparable in species and size as required by the Engineer. Where it is necessary to replace trees or vegetation damaged by construction, the Contractor shall bear all expenses associated with replacement and establishment of the replacement vegetation.

D. The contractor shall provide any necessary irrigation and other care necessary to warrant the replacement vegetation for two growing seasons (April thru September) following replacement.

PART 2 - PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

A. Post Mounted and Wall Mounted Traffic Control and Informational Signs, as specified.

B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

C. Flag Person Equipment: As required by local jurisdictions.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

3.02 ACCESS TO SITE

A. Contractor shall conduct all business through the gate assigned by the Engineer.

1. The Contractor may be required to relocate entry and related work areas as required by Port Operations.

B. Provide unimpeded access for emergency vehicles. Maintain 20 foot (6 m) width driveways with turning space between and around combustible materials.

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

3.03 PARKING

A. All Contractor's employee cars and work vehicles will be parked on-site as designated by the Engineer.

B. Arrange for temporary parking areas to accommodate need of construction personnel.

C. When site space is not adequate, provide additional off-site parking.

D. Supervisory personnel will be issued permits for access to the site.

3.04 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Port operations.

B. Prevent parking on or adjacent to access roads or in non-designated areas.

3.05 TRAFFIC CONTROL

A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

B. The Contractor shall erect and maintain all construction signs, warning signs, detour signs, flaggers and other traffic control devices necessary for the safe ingress and egress of the Project Site. Traffic control shall include but is not limited to:

1. Flaggers to direct traffic as required by Tacoma Rail to accommodate the Contractor's work.

2. The Contractor shall be liable for injuries and damages to persons and property suffered by reason of the Contractor's operations or any negligence in connection therewith.

3. Flagging, signs, and all other traffic control devices furnished or provided shall conform to established WSDOT and City of Tacoma standards. No work shall be done on or adjacent to the above locations until all necessary signs and traffic control devices are in place. During the course of the work, the Contractor shall be responsible for providing and maintaining adequate traffic control measures for the protection of the Contractor's work and the public.

3.06 FLARES AND LIGHTS

A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.07 HAUL ROUTES

A. Confine construction traffic to designated haul routes.

B. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.08 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, Products, mud, snow, and ice.

B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.09 REMOVAL, REPAIR

A. Repair existing facilities damaged by use, to original condition.

B. Repair damage caused by installation.

3.10 PUBLIC STREET AND ONSITE ROADWAY CLEANING

A. The Contractor shall be responsible for preventing dirt and dust escaping from trucks and other vehicles operating on or departing the project site by sweeping, covering dusty loads, washing truck tires and all other reasonable methods.

B. When trucks and other equipment are operating on paved public streets and site roadways/paved surfaces, the Contractor will be required to clean said streets, roadways and other paved surfaces at least daily, and at other times if required by the Engineer.

C. In the event that the above requirements are violated and no action is taken by the Contractor after notification of infraction by the Engineer, the Port reserves the right to have the streets, roadways and other paved surfaces in question cleaned by others and the expense of the operation charged to the Contractor.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes requirements relating to the following:

1. Access roads
2. Parking
3. Construction parking controls
4. Traffic Control
5. Flares and lights
6. Haul routes
7. Maintenance
8. Removal, repair
9. Mud from site vehicles

PART 2 - PRODUCTS

2.01 SIGNS, SIGNALS, AND DEVICES

A. Post Mounted and Wall Mounted Traffic Control and Informational Signs, as specified.

B. Traffic Cones and Drums, Flares and Lights: As approved by local jurisdictions.

C. Flag Person Equipment: As required by local jurisdictions.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

3.02 ACCESS TO SITE

A. Contractor shall conduct all business through the gate assigned by the Engineer.

1. The Contractor may be required to relocate entry and related work areas as required by Port Operations.

B. Provide unimpeded access for emergency vehicles. Maintain 20 foot (6 m) width driveways with turning space between and around combustible materials.

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

3.03 PARKING

A. All Contractor's employee cars and work vehicles will be parked on-site as designated by the Engineer.

3.04 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Port operations.

B. Prevent parking on or adjacent to access roads or in non-designated areas.

3.05 TRAFFIC CONTROL

A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

B. The Contractor shall erect and maintain all construction signs, warning signs, detour signs, flaggers and other traffic control devices necessary for the safe ingress and egress of the Project Site. Traffic control shall include but is not limited to:

1. Flaggers to direct traffic as required by Tacoma Rail to accommodate the Contractor's work.

2. The Contractor shall be liable for injuries and damages to persons and property suffered by reason of the Contractor's operations or any negligence in connection therewith.

3. Flagging, signs, and all other traffic control devices furnished or provided shall conform to established WSDOT and City of Tacoma standards. No work shall be done on or adjacent to the above locations until all necessary signs and traffic control devices are in place. During the course of the work, the Contractor shall be responsible for providing and maintaining adequate traffic control measures for the protection of the Contractor's work and the public.

3.06 FLARES AND LIGHTS

A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

3.07 HAUL ROUTES

A. Confine construction traffic to designated haul routes.

B. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

3.08 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, Products, mud, snow, and ice.

B. Maintain existing paved areas used for construction. Promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.09 REMOVAL, REPAIR

A. Repair existing facilities damaged by use, to original condition.

B. Repair damage caused by installation.

3.10 PUBLIC STREET AND ONSITE ROADWAY CLEANING

A. The Contractor shall be responsible for preventing dirt and dust escaping from trucks and other vehicles operating on or departing the project site by sweeping, covering dusty loads, washing truck tires, and all other reasonable methods.

B. When trucks and other equipment are operating on paved public streets and site roadways/paved surfaces, the Contractor will be required to clean said streets, roadways, and other paved surfaces at least daily, and at other times if required by the Engineer.

C. In the event that the above requirements are violated and no action is taken by the Contractor after notification of infraction by the Engineer, the Port reserves the right to have the streets, roadways, and other paved surfaces in question cleaned by others and have the expense of the operation charged to the Contractor.

END OF SECTION

This page intentionally left blank

PART 1 – GENERAL

1.01 SUMMARY

A. The Work shall consist of planning, installing, inspecting, maintaining and removing Temporary Erosion and Sediment Control (TESC) Best Management Practices (BMPs) to prevent pollution of air and water; and to control, respond to, and dispose of eroded sediment and turbid water during the term of the Contract.

B. The Contractor shall use a project-specific SWPPP to meet or exceed the control measures required by the Washington Department of Ecology (Ecology). The SWPPP describes the proposed construction activities and all Temporary and Permanent Erosion and Sediment Control (ESC) measures, pollution prevention measures, inspection/monitoring activities, and recordkeeping that will be implemented during the proposed construction project. The Contractor shall have an individual who is a Certified Erosion and Sediment Control Lead (CESCL) on site or on-call at all times.

   1. The SWPPP consists of planning, installing, inspecting, maintaining, and removing TESC BMPs per Volume II of the Stormwater Management Manual for Western Washington (current version). The BMPs are designed to prevent pollution of air and water, to control peak volumetric flow rates and velocity of stormwater, and to control, respond to, and dispose of eroded sediment and turbid water during the term of the Contract.

   2. The Contractor will be responsible for updating the SWPPP to reflect changes to BMPs, as needed, to comply with the Construction Stormwater General Permit at no additional cost to the Port.

C. These TESC requirements shall apply to all areas associated with the Work, including but not limited to the following:

   1. Work areas;

   2. Equipment and material storage areas;

   3. Staging areas;

   4. Stockpiles; and

   5. Discharge points within or adjacent to the work areas that are impacted by stormwater runoff from the site.

D. Acceptance of TESC plans does not constitute an approval of permanent Work or drainage design (e.g., size and location of roads, pipes, restrictors, channels, retention facilities, utilities, etc.).

E. Contractor shall read and conform to all requirements set forth in Washington Department of Ecology's (Ecology) NPDES General Permit for Discharges Associated with Construction Activities (CSGP).

1.02 REFERENCES

A. The rules, requirements, and regulations that apply to this Work include, but are not necessarily limited to the following:

   1. Washington Department of Ecology, "Stormwater Management Manual for Western Washington," current version.

   2. Washington Department of Ecology NPDES General Permit for Discharges Associated with Construction Activities (CSGP), current version.

3. Washington State Department of Transportation, current version, Standard Specification M41-10, Division 8-01 Erosion Control and Water Pollution Control.
4. Pierce County Stormwater and Site Development Manual, current version (if applicable).
5. Administrative Order #_XXXXX_, Department of Ecology, current version (if applicable).

1.03 SUBMITTALS

A. Prior to the start of any construction activities, a Construction Stormwater Pollution Prevention Plan (SWPPP), as required by the CSGP.
   1. Contractor must adopt and comply with either a Port project SWPPP, or provide an alternative project SWPPP.
   2. Contractor shall be responsible for updating the project SWPPP during construction to reflect the required changes to BMPs and personnel, as needed, to comply with the CSGP at no additional cost to the Port.

B. Safety Data Sheet (SDS) for any dust palliative product.

C. A copy of all Contractor site inspection logs and monthly Discharge Monitoring Reports (DMRs).

D. The name and contact number of the Certified Erosion and Sediment Control Lead (CESCL).

1.04 AUTHORITY OF ENGINEER

A. The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations, as determined by analysis of project conditions; and to direct the Contractor to provide immediate permanent or temporary pollution control measures to minimize impacts to adjacent streams or other watercourses, lakes, ponds, and other areas of water impoundment.

B. In the event that areas adjacent to the work area are suffering degradation due to erosion, sediment deposit, water flows, or other causes, the Engineer may stop construction activities until the Contractor rectifies the situation.

PART 2 – PRODUCTS

2.01 DUST CONTROL

A. Dust palliative for dust control proposed by the Contractor and approved by the Engineer.

PART 3 – EXECUTION

3.01 GENERAL

A. The Port is subject to a NPDES General Permit for Discharges Associated with Construction Activities (CSGP). The permit shall be transferred to the Contractor prior to ground disturbing activities. The Contractor shall be the responsible Operator/Permittee for the duration of the project.

B. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply as determined by the Engineer.

C. No project discharge of water shall be allowed that exceeds the regulated pollutant levels in Ecology's NPDES permit associated with the Projectand any CSGP-associated Administrative Orders (if applicable).

D. Contractor shall be solely responsible for all BMP modifications and upgrades to comply with the CSGP and the requirements of this Section, at no additional cost to the Port.

E. Contractor shall be solely responsible for any damages and fines incurred because of Contractor, subcontractor, or supplier actions in implementing the requirements of this Section.

F. The Contractor shall be solely responsible for schedule impacts incurred because of Contractor, subcontractor, or supplier actions in implementing the requirements of this Section.

3.02 TEMPORARY EROSION AND SEDIMENT CONTROL DEVELOPMENT

A. The Contractor is responsible for developing the TESC BMPs and incorporating them into the SWPPP. The Contractor shall address the following issues as part of developing and implementing the BMPs.

1. The TESC notes and details shown in the Drawings and the information in this Section of these Specifications are minimum requirements for the anticipated site conditions during the construction period. During the construction period the Contractor shall, at no additional cost to the Port, upgrade the TESC measures as needed for unexpected storm events and modify these measures for changing site conditions (such as relocation of ditches and silt fences, etc.) and update the SWPPP to document the modifications made.

2. The Contractor shall inspect the TESC measures daily and maintain these measures to ensure continued proper functioning during the construction period. The Contractor will keep written records on site of inspections on a weekly basis during the wet season (October 1 through April 30) and on a monthly basis during the dry season (May 1 through September 30). The Contractor shall provide the Port with copies of the TESC inspections, as stated in Section 1.03 above.

3. Any areas needing TESC measures not requiring immediate attention shall be addressed by the Contractor at the Port's discretion.

4. The TESC measures in an inactive site shall be inspected and maintained by the Contractor at a frequency described in the Project Construction Stormwater NPDES General Permit.

5. The Contractor shall be responsible for implementing the SWPPP and shall modify the SWPPP as required to reflect on-site activities and personnel.

B. Contractor shall develop project-specific TESC BMPs and incorporate them into the SWPPP.

1. The SWPPP shall comply with the requirements in Ecology’s Volume II of the Stormwater Management Manual for Western Washington (current version) or equivalent.

2. TESC notes and details shown in the Drawings and the information in this Section form a basis of the minimum requirements for a TESC Plan. Contractor shall develop a TESC Plan specific to the construction schedule and proposed means and methods prior to commencing construction activities for the duration of the Project.

C. Contractor shall inspect the existing system and report to the Engineer the levels of existing material prior to installation of TESC BMPs.

3.03 TEMPORARY EROSION AND SEDIMENT CONTROL IMPLEMENTATION

A. Contractor is responsible for implementing and updating the SWPPP including TESC BMPs.

1. Contractor shall inspect the TESC measures daily and maintain these measures to ensure continued proper functioning for the duration of the Project.

2. Contractor will be responsible for documenting TESC site inspections on a weekly basis in areas of active construction and on a monthly basis in areas that have undergone stabilization. Contractor shall keep records of the inspections on site.
3. During the construction period the Contractor shall, at no additional cost to the Port, upgrade and/or maintain TESC measures as needed, based on Contractor means and methods, work sequencing, and changing site conditions (e.g., changes to impervious surface coverage, proximity of work to storm conveyance systems, storm events, etc.). Contractor shall modify these measures for changing site conditions and update the SWPPP to document all modifications made.

B. Contractor shall clean all stormwater components affected by construction debris prior to Work completion, per TESC BMPs for catch basin maintenance. The cleaning process shall not flush sediment-laden water into a downstream system.

C. Contractor shall ensure that water, or a dust palliative and a dispensing subcontractor, if needed, is available for project use. It is the responsibility of the Contractor to develop and adhere to appropriate safety measures pertaining to the palliative use. This also includes ensuring the dispensing subcontractor develops and adheres to the appropriate safety measures, if a dispensing subcontractor is used. Water used for dust suppression shall not be applied at such a rate or in a location that it will generate runoff from the site.

D. Areas of exposed soils, including embankments, which will not be disturbed for two days during the wet season (October 1 through April 30) or seven days during the dry season (May 1 through September 30), shall immediately be stabilized by the Contractor with an Ecology-approved TESC measure (e.g., seeding, mulching, plastic covering, etc.).

E. TESC measures in an inactive area shall be inspected and maintained by the Contractor until the area is permanently stabilized.

F. In the event that additional temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the Work as scheduled or as ordered by the Engineer, such work shall be performed by the Contractor at its own expense.

G. Contractor shall remove all TESC facilities, install permanent site surfacing improvements and permanent BMPs with minimal disturbance, and shall clean stormwater facilities prior to Work completion.

H. Contractor shall terminate the CSGP upon final stabilization of the site.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the requirements to provide product data under the applicable specification section.

1.02 SUBMITTALS

A. 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.

B. 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.

C. 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 NEW PRODUCTS

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

2.02 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.

PART 3 - EXECUTION

3.01 TRANSPORTATION AND HANDLING

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

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

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

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

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

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

3.02 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

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

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

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

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

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

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

I. 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

PART 1 - GENERAL

1.01 SUMMARY

A. Prior to requesting final inspection, the Contractor shall assure itself that the project is complete in all aspects.

PART 3 - EXECUTION

2.01 FINAL DOCUMENTS

A. Project As-Built Drawings

1. Project As-Built Drawings shall be compiled by the Contractor and submitted to the Engineer for translation to the Record Drawings on a monthly basis.
2. The Project As-Built Drawings will be submitted on paper full-sized (ANSI D) copy.
3. Drawings shall be kept current and shall be done at the time the material and equipment is installed. Annotations to the record documents shall be made with an erasable colored pencil conforming to the following color code:
    a. Additions - Red
    b. Deletions - Green
    c. Comments - Blue
    d. Dimensions - Graphite
4. Project As-Built Drawings must be complete and accepted by the Engineer before Final Completion is issued.
5. As-Built Drawings shall be in accordance with horizontal and vertical control as shown on the drawings.

B. Final Survey

1. See Section 01 71 23 Field Engineering for Final Survey requirements. The Final Survey shall be completed and submitted to the Engineer within 30 days of Substantial Completion. Final Survey must be complete and accepted by the Engineer before Final Completion is issued.

C. The following Certificates shall be submitted by the Contractor prior to Final Completion:

1. Certificates of Conformance
    a. Notice of Termination (NOT) Construction Stormwater General Permit: (Confirmation of Termination request acceptance by DOE).

2.02 CLEAN-UP

A. Definition: Except as otherwise specifically provided, “clean” (for the purpose of this Article) shall be interpreted as meaning the level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality building maintenance equipment and materials.

B. General: Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described above.

C. Site: Unless otherwise specifically directed by the Engineer, hose down all paved areas on the site, all public sidewalks and catch basins on adjoining streets. Completely remove all resultant debris.

D. Structure:

1. Exterior: Visually inspect all exterior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior or the structure. In the even of stubborn stains not removable with water, the Engineer may require light sandblasting or other cleaning at no additional cost to the Port.

2. Interior: Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all paint droppings, spots, stains, and dirt from finished surfaces. Use only the specified cleaning materials and equipment.

3. Clean all glass inside and outside.

4. Polished Surfaces: To all surfaces requiring the routine application of buffed polish, apply the specified polish as recommended by the manufacturer of the material being polished.

E. Timing: Schedule final cleaning as approved by the Engineer to enable the Port to occupy a completely clean project.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes requirements relating to the following:

1. Examination, preparation, and general installation procedures
2. Cutting and patching

1.02 SUBMITTALS

A. 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; and
5. Work of the Port or separate Contractor.

B. Project As-Built Documents: Accurately record actual locations of capped and active utilities.

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.

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 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.

3.04 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; and
8. Remove and replace defective and non-conforming 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 flush to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. 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.

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

3.06 ADJUSTING

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

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes field engineering and land surveying services by Contractor.

1.02 DESCRIPTION OF SERVICES

A. Specific services listed in this section are in addition to, and do not supersede, general Execution and Closeout Requirements.

B. Sole responsibility for establishing all locations, dimensions and levels of items of work.

C. Sole responsibility for provision of all materials required to establish and maintain benchmarks and control points, including batter boards, grade stakes, structure elevation stakes, and other items.

D. Keeping a transit, theodolite, or TST (total station theodolite with electronic distance measurement device); leveling instrument; and related implements such as survey rods and other measurement devices, at the project site at all times.

E. Provision of facilities and assistance necessary for Architect to check lines and grade points placed by Contractor.

1. Performance of excavation or embankment work until after all cross-sectioning necessary for determining payment quantities for Unit Price work have been completed and accepted by Architect.

F. Preparation and maintenance of daily reports of activity on the work. Submission of reports containing key progress indicators and job conditions to Architect.

1. Major equipment and materials installed as part of the work.
2. Location of areas in which construction was performed.
3. Work performed, including field quality control measures and testing.
4. Weather conditions.
5. Instructions received from Architect or Port, if any.

G. Preparation and maintenance of professional-quality, accurate, well organized, legible notes of all measurements and calculations made while surveying and laying out the work.

1.03 REFERENCE STANDARDS

A. FGDC-STD-007.1 - Geospatial Positioning Accuracy Standards - Part 1: Reporting Methodology; 1998.

B. FGDC-STD-007.2 - Geospatial Positioning Accuracy Standards - Part 2: Standards for Geodetic Networks; 1998.

C. FGDC-STD-007.4 - Geospatial Positioning Accuracy Standards - Part 4: Architecture, Engineering, Construction, and Facilities Measurement; 2002.

D. State Plane Coordinate System for the State in which the Project is located.

1.04 QUALITY ASSURANCE

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 FIELD ENGINEERING

A. Maintain field office files, drawings, specifications, and record documents.

B. Coordinate field engineering services with Contractor's subcontractors, installers, and suppliers as appropriate.

C. Prepare layout and coordination drawings for construction operations.

D. Check and coordinate the work for conflicts and interferences, and immediately advise Architect and Port of all discrepancies of which Contractor is aware.

E. Cooperate as required with Architect and Port in observing the work and performing field inspections.

F. Review and coordinate work on a regular basis with shop drawings and Contractor's other submittals.

G. Check the location, line and grade of every major element as the work progresses. Notify the Architect when deviations from required lines or grades exceed allowable tolerances. Include in such notifications a thorough explanation of the problem, and a proposed plan and schedule for remedying the deviation. Do not proceed with remedial work without Port's concurrence of the remediation plan.

3.02 LAND SURVEYING

A. General: Follow standards for geospatial positioning accuracy.

1. FGDC-STD-007.1as amended by Authority Having Jurisdiction.

2. FGDC-STD-007.2as amended by Authority Having Jurisdiction.

3. FGDC-STD-007.4as amended by Authority Having Jurisdiction.

B. Coordinate survey data with the State Plane Coordinate System of the State in which the Project is located.

C. Contractor is responsible for the restoration of all property corners and control monuments damaged or destroyed by construction-related activities. Any disturbed monuments must be replaced at Contractor's expense by a surveyor licensed in the State in which the Project is located, and approved by the Architect.

1. Temporarily suspend work at such points and for such reasonable times as the Port may require for resetting monuments. The Contractor will not be entitled to any additional compensation or extension of time.

3.03 REPORTS

A. Submit two copies of Contractor's daily reports at Architect's field office (or electronically) by 9:00 AM the next working day after the day covered in the associated report. Daily report shall be signed by responsible member of Contractor's staff, such as project manager or superintendent, or foreman designated by Contractor as having authority to sign daily reports.

3.04 RECORDS

A. Maintain at the Site a complete and accurate log of control and survey work as it progresses.

1. Organize and record survey data in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standards of practice in the State in which the Project is located. Record Contractor's surveyor's original field notes, computations, and other surveying data in Contractor-furnished hard-bound field books. Contractor is solely responsible for completeness and accuracy of survey work, and completeness and accuracy of survey records, including field books. Survey records,(including field books) may be rejected by Port due to failure to organize and maintain survey records in a manner that allows reasonable and independent verification of calculations, and/or allows identification of elevations, dimensions, and grades of the work.

2. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by Architect.

B. Submit three copies of final property survey to Port. Include on the survey a certification, signed by the surveyor, that principal metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey. Include the following information:

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes information for progress and final cleaning and restoration of damaged work prior to final inspection.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 PROGRESS CLEAN-UP

A. The Contractor shall clean the project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with all requirements for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    a. Use containers intended for holding waste materials for the type of material to be stored.
4. Coordinate progress cleaning for joint use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free from waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 3.02 Final Cleaning.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration until Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.02 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.

c. Rake grounds that are neither planted· nor paved to a smooth, even-textured surface.

d. Remove tools, construction equipment, machinery, and surplus material from Project site.

e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances.

f. Remove debris and surface dust from limited access spaces, including roofs. attics, and similar spaces.

g. Sweep concrete floors broom clean in unoccupied spaces.

h. Remove labels that are not permanent.

i. Clean light fixtures, lamps. globes, and reflectors to function with full efficiency.

j. Leave Project clean and ready for occupancy.

3.03 REPAIR OF WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surface, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
2. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes construction waste management requirements.

1.02 DESCRIPTION OF WORK

A. The work includes demolition and removal within the project areas as shown on the drawings. The work also includes waste generated by construction activities, materials, packaging, scraps, and garbage.

B. Soils excavated within the projects areas, as shown on the drawings, are anticipated to be free of contamination, however, should the Contractor, using visual and olfactory methods, identify potentially contaminated soil, the Contractor shall notify the Engineer to determine if the soil requires special handling. This material shall be segregated from other excavated material. It shall be stockpiled on plastic and covered with plastic until such time as appropriate testing and analysis can be completed by the Engineer. Upon completion of the testing and analysis the Engineer will direct the Contractor concerning the disposition of the material. Soil beyond construction excavation limits will not require excavation unless free draining product is observed or other special conditions exist in which case the Engineer will direct the Contractor in additional excavation. Soils determined to be contaminated will be hauled and disposed of at a locations designated in the following paragraphs.

1.03 DEFINITIONS

A. Co-mingled or Off-site Separation: Collecting all material types into a single bin or mixed collection system and separating the waste materials into recyclable material types at an off-site facility.

B. Construction, Demolition and Land-Clearing (CDL) Waste: Includes all nonhazardous solid wastes resulting from construction, remodeling, alterations, repair, demolition, and land clearing. Includes material that is recycled, reused, salvaged or disposed as garbage.

C. Hazardous/Dangerous Waste: As defined by Chapter 70.105.010 Revised Code of Washington and 40 Code of Federal Register 261 and by Washington Administrative Code 173-303.

D. Proper Disposal: As defined by the jurisdiction receiving the waste.

E. Recyclable Materials: Products and materials that can be recovered and remanufactured into new products.

F. Recycling: The process of sorting, cleaning, treating and reconstituting materials for the purpose of using the material in the manufacture of a new product. Can be conducted on-site (as in the grinding of concrete).

G. Recycling Facility: An operation that is permitted to accept materials for the purpose of processing the materials into an altered form for the manufacture of a new product.

H. Salvage for Reuse: Existing usable product or material that can be saved and reused in some manner on the project site or other projects off-site.

I. Salvage for Resale: Existing usable product or material that can be saved and removed intact (as is) from the project site to another site for resale to others without remanufacturing.

J. Source-Separated Materials: Materials that are sorted at the site into separate containers for the purpose of reuse or recycling.

K. Sources Separation: Sorting the recovered materials into specific material types with no, or a minimum amount of, contamination on site.

L. Time-Based Separation: Collecting waste during each phase of construction or deconstruction that results in primarily one major type of recovered material. The material is removed before it becomes mixed with the material from the next phase of construction.

M. Garbage: Product or material typically considered to be trash or debris that is unable to be salvaged for resale, salvaged and reused, returned, or recycled.

N. Olfactory Indications (methods): Of or relating to the sense of smell. Soils contaminated with petroleum and other volatile constituents typically exhibit characteristic odors that can be detected (and sometimes identified) by smell.

O. PID: Photo Ionization Detector. A field instrument that is used to detect the presence of and give a relative indication of the concentration of vapors emitted from volatile constituents (contamination) in environmental media (soil and water).

P. Soil (waste) Profile: A characterization of the chemical and physical properties of a waste material including the types of contaminants and their concentrations as measured by approved laboratory analytical methods. A profile is required by the receiving permitted disposal or recycling facility.

Q. Special Handling: Refers to hauling and disposal of soils that, because they are contaminated, cannot be reused in place as backfill or as general fill at another location. Such soils must be hauled to and managed at a permitted disposal or recycling facility.

R. Type A Contaminated Soil: Soil that must be removed from the Project site and has been determined by the Engineer to contain petroleum hydrocarbons in concentrations exceeding state or federal cleanup standards or special Port determined criteria. Type A soil requires disposal at an approved facility.

S. Type B Contaminated Soil: Soil that must be removed from the Project site and has been determined by the Engineer to contain petroleum hydrocarbons or other contaminants in concentrations that will require disposal or recycling at one of the approved facility.

T. Type C Contaminated Soil: Soil determined by Engineer to contain unknown constituent(s) and requires further testing and classification. Type C soil requires disposal at one of the approved facility.

U. Type D Material: Material including soil, determined by the Engineer not to require special handling with regard to this Contract. Classification of material as Type D material by the Port is not a certification nor does it release the Contractor of liability or obligation to meet any disposal or storage facility acceptance or testing requirements.

V. Unanticipated Contamination: Contamination unexpectedly found in an excavation or in other locations where there is no prior knowledge, information, or history to indicate possible spills or releases of contamination.

W. Visual Indications (methods): A preliminary evaluation of the potential presence of contamination based on visual observation. For example, fuel contaminated soils are frequently discolored or stained relative to non-petroleum impacted native soils or clean fill.

1.04 SUBMITTALS

A. Waste Management Plan

B. Waste Management Final Report

C. Soils Management Plan

D. Soils Hauling Receipts

1.05 PERFORMANCE GOALS

A. General: Divert CDL waste to the maximum extent practicable from the landfill by one or a combination of the following activities:

1. Salvage
2. Reuse
3. Source separated CDL recycling
4. Co-mingled CDL recycling

B. CDL waste materials that can be salvaged, resold, reused or recycled, include, but are not limited to the following:

1. Clean dimensional wood, pallet wood, plywood, OSB, and particleboard
2. Asphalt
3. Concrete and concrete masonry units
4. Ferrous and non-ferrous metals
5. Field office waste paper, aluminum cans, glass, plastic, and cardboard

C. Hazardous/Dangerous Wastes, contaminated soils and other hazardous materials such as paints, solvents, adhesives, batteries, and fluorescent light bulbs and ballasts shall be disposed of at applicable permitted facilities.

1.06 WASTE MANAGEMENT PLAN

A. Submit a Waste Management Plan within 10 days after the notice to proceed and not less than 5 days before any demolition activities in accordance with these specifications. Provide a Waste Management Plan in a format as approved by the Engineer.

B. The Waste Management Plan shall include the following:

1. Name of designated Waste Management Coordinator.
2. A list of waste materials, including estimated types and quantities, of the waste that will be generated. Indicate salvaged for resale, salvaged for reuse, recycled, or disposed for each item.
3. Identify waste handling methods to be used, including one or more of the following:
    a. Method 1 - Contractor or subcontractor(s) hauls recyclable materials to an approved recycling facility.
    b. Method 2 - Contracting with diversion/recycling hauler to haul recyclable material to an approved recycling or material recovery facility.
    c. Method 3 - Recyclable material reuse on-site.
    d. Method 4 - Recyclable material salvage for resale.
    e. Method 5 - Contractor or subcontractor hauls waste to an approved disposal facility.

4. Identification of each recycling, disposal, or material recovery facility to be utilized, including name, address and types of materials being recycled at each facility.
5. Description of the method to be employed in collecting, and handling, waste materials.
6. Description of methods to communicate Waste Management Plan to personnel and subcontractors.
7. Actions that will be taken to reduce solid waste generation.

C. Revise and resubmit Waste Management plan as required by the Engineer. Approval of the Contractor's Plan does not relieve the Contractor of responsibility for compliance with all applicable laws and regulations. Distribute copies of the Waste Management Plan to each subcontractor.

1.07 WASTE MANAGEMENT FINAL REPORT

A. Provide a Waste Management Final Report, in a format approved by the Engineer. The Waste Management Final Report shall list the following for the project:

1. A record of each waste material type and quantity recycled, reused, salvaged, or disposed from the Project. Include total quantity of waste material removed from the site and hauled to a landfill.
2. Percentage of total waste material generated that was recycled, reused, or salvaged.

B. Quantities shall be reported by weight (tons) unless otherwise approved by the Engineer.

C. Submit copies of manifests, weight tickets, recycling/disposal receipts or invoices, which validate the calculations or a signed certification of completeness and accuracy of the final quantities reported.

1.08 SOILS MANAGEMENT PLAN

A. A minimum of 10 days prior to excavation of any subsurface materials, submit a Soils Management Plan to the Engineer. The Soils Management Plan must be approved by the Engineer prior to any excavation of subsurface materials. Include the following in the Soils Management Plan:

1. Identification of all soil disposal/recycling facilities to be used on the project for Type A and B Contaminated Soil.
2. Identification of all fill sites, disposal facilities and/or end uses of material determined to be Type D Material.
3. Contingency for delivery and placement of Type C Contaminated Soil at an onsite Soil Stockpile area.
4. Contingency for managing debris encountered during excavation that may disqualify soil for disposal or recycle at the approve facilities.
5. General description of how equipment operators, safety personnel and other applicable Contractor shall coordinate with the Engineer to facilitate handling of contaminated soil in accordance with this specification.
6. Description of all haul routes to be used on the project.

B. Include in the Two Week Look Ahead Schedule specific time frames for excavation. Each excavation activity shall be given an individual line item description, time frame and duration.

C. Notify the Engineer prior to hauling contaminated soil to the soil disposal facility. The notification shall include:

1. An estimate of the number of truck-trips, the haul destination, and the period in which these trips will be made (e.g., 20 truck-trips to the Waste Management Facility over the two-week period beginning on March 1, 2012).

1.09 QUALITY ASSURANCE

A. Regulatory Requirements: The Contractor shall maintain compliance with all applicable Federal, State, or Local laws that apply to Construction Waste Management and material salvage, reuse, recycling and disposal.

B. Disposal Sites, Recyclers and Waste Materials Processors: All facilities utilized for management of any materials covered under this specification must maintain all necessary permits as required by federal, state and local jurisdictions.

1.10 HEALTH AND SAFETY

A. The Contractor is required to implement all health and safety provisions as required by Specification 01 35 29 - Health, Safety and Emergency Response Procedures.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 WASTE DISPOSAL

A. Source-Separated CDL Recycling: Provide individual containers for separate types of CDL waste to be recycled, clearly labeled with a list of acceptable and unacceptable materials.

B. Co-Mingled CDL Recycling: Provide containers for co-mingled CDL waste to be recycled, clearly labeled with a list of acceptable and unacceptable materials.

C. Landfill: Provide containers for CDL waste that is to be disposed of in a landfill clearly labeled as such.

D. Removal of CDL Waste from Project Site: Transport CDL waste off Port's property and provide legal disposal.

3.02 SOIL DISPOSAL

A. Excavation/Testing: The field-testing for contaminated soil will be performed by the Port and will result in the following classification of material as defined in paragraph DEFINITIONS of this section:

1. Type A Contaminated Soil.

2. Type B Contaminated Soil.

3. Type C Contaminated Soil.

4. Type D Material.

B. Disposition of Material

1. Type A and B Contaminated Soil: Material determined to be Type A or B Contaminated Soil shall be hauled by the Contractor to an approved facility for disposal.

2. Type C Material: Material determined to be Type C is of unknown origin or special circumstances. Material determined to be Type C contaminated soils shall be hauled to an onsite Soil Stockpile Site area. The Contractor shall protect the material once stockpiled. The Port will direct the Contractor on the disposition of the material following the analysis of the suspect material.
3. Type D Material: Material determined not to require special handling (Type D) shall be hauled by the Contractor to a site determined by the Contractor. If testing or certification of this material is required by the receiving site, the Contractor shall complete these requirements. The Port will not certify or declare the material suitable for unrestricted use.

C. Other Requirements

1. Cover all soil stockpiles and maintain stockpile areas in accordance with SECTION 01 57 13 - Temporary Erosion and Sediment Control and Construction Stormwater Pollution Prevention.
2. Material determined to be Type A, Type B or Type C contaminated material may be, upon approval of the Engineer, temporarily stockpiled within the construction area. Provide an impervious liner beneath this soil and securely cover with a waterproof covering. Remove the material prior to completion of work in the work area.
3. Submit all hauling receipts (or copies of receipts) from the receiving facility for all Type A, Type B or Type C Contaminated soil at least weekly.
4. The Engineer may require shut down of excavation should unforeseen condition warrant.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures
2. Final completion procedures
3. Warranties
4. As-Built Drawings

1.02 ACTION SUBMITTALS

A. Contractor’s List of Incomplete Items: Initial submittal at Substantial Completion.

1.03 PROJECT SUBMITTALS

A. Submittal of Project Warranties

B. Record Drawings

1. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous recordkeeping requirements and submittals in connection with various construction activities.

C. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.04 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request:

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Port unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in individual Sections, including specific warranties, operation and maintenance manuals, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by the Contract Document or Engineer. Label with manufacturer's name and model number where applicable.
4. Submit test/adjust/balance records.
5. Submit changeover information related to Port's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request:

1. Complete startup and testing of systems and equipment
2. Instruct Port's personnel in operation, adjustment, and maintenance of products, equipment, and systems
3. Complete final cleaning requirements

D. Submit a written request for inspection to determine Substantial Completion a minimum of 14 days prior to the date the work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Notice of Substantial Completion after inspection or will notify Contractor of items, either on the Contractor’s list or additional items identified by the Engineer, that must be completed or corrected before notice will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.05 PUNCH LIST (LIST OF INCOMPLETE ITEMS)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of Construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major elements.

1.06 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete and submit the following:

1. Submittal of all remaining items, including as-built documents, final completion construction photographic documentation, damage or settlement surveys, surveys, and similar final record information and all other submittals defined in the Contract Documents.
2. List of Incomplete Items: Submit copy of Engineer’s Substantial Completion inspection list of items to be completed or corrected (Punch List). Copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 14 days prior to date the work will be complete and ready for final inspection and tests. On receipt of request, the Engineer will either proceed with inspection or notify contractor of unfulfilled requirements.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

C. Execution of all Change Orders.

1.07 FINAL ACCEPTANCE PROCEDURES

A. Submittals Prior to Final Acceptance:

1. Receipt and approval of application for final payment; due within seven (7) days of receipt of Final Completion by the Engineer;
2. Contractor's signed waiver and release of claims on the Engineer provided form;
3. Contractor's submittal of list of all suppliers and subcontractors and the total amounts paid to each on the Engineer provided form; and
4. Contractor's submittal of a list of all subcontractors and suppliers requiring Affidavits of Wages paid on the Contract and certify that each of companies will submit an approved Affidavit of Wages paid to the Port within 30 days.

B. The Engineer will issue the Final Acceptance Memo upon receipt of the required submittals.

PART 2 - PRODUCTS

2.01 CONTRACTOR'S WARRANTY

A. The Contractor warrants the labor, materials and equipment delivered under the contract to be free from defects in design, material, or workmanship, and against damage caused prior to final inspection. Unless otherwise specified, this warranty extends for a period of one (1) year from the date of Substantial Completion.

1. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit the Port's rights under warranty.
2. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Port or Port tenants during construction.
3. Submit Warranties to the Engineer as a submittal, as described in 01 33 00 – Submittal Procedures.
4. Provide additional copies of each warranty in Operation and Maintenance Manuals as described in 01 78 23 – Operation and Maintenance Manuals.

B. In the event of equipment failure, during such time or in such a location that immediate repairs are mandatory, the Contractor shall respond promptly (within 48 hours), irrespective of day of the week. If the Contractor is not available, the Port will affect repairs. The Contractor shall then reimburse the Port for parts and labor necessary to correct deficiencies as defined within the warranty clause and time.

2.02 AS-BUILT DRAWINGS

A. Project As-Built Drawings: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

B. Project As-Built Drawings shall be compiled by the Contractor and submitted to the Engineer for translation to the Record Drawings on a monthly basis.

1. The Project As-Built Drawings will be submitted on paper full-sized (ANSI D) copy.
2. Drawings shall be kept current and shall be done at the time the material and equipment is installed. Annotations to the record documents shall be made with an erasable colored pencil conforming to the following color code:

a. Additions – Red

b. Deletions – Green

c. Comments – Blue

d. Dimensions – Graphite

3. Project As-Built Drawings must be complete and accepted by the Engineer before Final Completion is issued.

4. As-Built Drawings shall be in accordance with horizontal and vertical control as shown on the drawings.

PART 3 – EXECUTION

3.01 MAINTENANCE OF AS-BUILT DRAWINGS

A. The Contractor shall maintain at the Project site, in good order for ready reference by the Engineer, one complete copy of the Contract Documents, including Addenda, Change Orders, other documents issued by the Port, a current Progress Schedule, and approved Submittals. The Contractor shall also generate and keep on site all documents and reports required by applicable permits.

B. The Contractor's As-Built Drawings shall be updated to record all changes made during construction. The location of all existing or new underground piping, valves and utilities, and obstructions located during the Work shall be appropriately marked until the Contractor incorporates the actual field dimensions and coordinates into the as-built drawings. The as-built drawings shall be updated at least weekly and before elements of the Work are covered or hidden from view. After the completion of the Work, the as-built drawings shall be provided to the Port.

END OF SECTION

PART 1 – GENERAL

1.01 SUMMARY

A. Operation and Maintenance Manual Submittal

1.02 SUBMITTALS

A. Operation and Maintenance Data:

1. For equipment, or component parts of equipment put into service during construction and operated by the Port, submit completed documents within ten days after acceptance.
2. Submit 1 copy of completed documents 7 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.
3. Submit 1 set of revised final documents in final form by Final Completion.

PART 2 - PRODUCTS

2.01 OPERATION AND MAINTENANCE MANUALS

A. For small equipment and products (such as furnishings or equipment not requiring routine maintenance),the following information (minimum of 3 printed copies, plus one electronic copy on CD) shall be furnished for all items on the Project requiring operational and/or maintenance procedures and for any additional items indicated by the Engineer. Printed information shall be organized by the Contractor into appropriately sized 3-ring binders (no larger than 3”).The binders shall be sized for material approximately 8-1/2 by 11 inches, and the material in the binders shall not protrude beyond the covers. The binder(s) shall be divided with coversheets for each major item of equipment. The cover sheets shall be typewritten to indicate the name, type of equipment, and location(s) within the Project where installed. A neatly typewritten index shall be provided. Electronic information shall be in PDF format (additional formats where specified) and shall be organized with folders and appropriate file names so as to make the information easily accessible:

1. Product Summary:
    a. Provide the following information (as applicable, indicate ‘N/A’ where an item does not apply) in Excel spreadsheet format:
        1) Asset Number (to be provided by the Engineer at a later date)
        2) Description
        3) Plan Sheet Number
        4) Parcel Number
        5) Vendor
        6) Manufacturer
        7) Model Year
        8) Serial Number
        9) Warranty – Start Date; Finish Date
        10) Purchase Price

11) Make

12) Model

2. Operating Procedures: These instructions consist of the manufacturer's recommended step-by-step procedures for use of the product.
3. Maintenance Procedures: These instructions consist of the equipment manufacturer's recommended steps and schedules for maintaining the product.
4. Specific Information: Where items of information not included in the above list are required, they will be provided as described in the specifications for the equipment.
5. Complete identification, including model and serial numbers.
6. Submittal information, as specified in Section 01 33 00 Submittal Procedures.
7. Warranty Information: This information consists of the name, address, and telephone number of the manufacturer's representative to be contacted for warranty, parts, or service information.
8. Provide DVDs, and audio-visual training materials utilized in the manufacturer's instruction program for the Port.
9. All operation and maintenance information shall be comprehensive and detailed and shall contain information adequately covering all normal operation and maintenance procedures.
10. All information shall be specific for the items of equipment installed on the project. Material not directly applicable shall be removed, omitted, or clearly marked as inapplicable.
11. If manufacturer's standard brochures and manuals are used to describe operating and maintenance procedures, such brochures and manuals shall be modified to reflect only the model or series of equipment used on this project.
12. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated. It shall be the responsibility of the Contractor to ensure that all operation and maintenance materials are obtained. Material submitted must meet the approval of the Engineer prior to project final acceptance.

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. Extent of Work: The extent and location of the “Demolition” Work is indicated on the drawings. The Work includes the requirements for the removal, wholly or in part and satisfactory disposal of fences, pavements, structures, or other features identified within these specifications. The Demolition Work is included on conduits, wires and other obstructions which are designated to be demolished on the drawings. The drawings should be used for guidance only and to indicate typical general construction features of the various types of structures and is not to be construed as definitive or adequate to supplant the actual on-site inspection by the Contractor.

1.02 GOVERNING CODES, STANDARDS, AND REFERENCES

A. U.S. Department of Labor Occupational Safety & Health Administration
    1. OSHA Standard 1926.850(a), Preparatory Operations
B. Pierce County burning of debris
C. City of Tacoma material transfer tax
D. Tacoma Public Utilities
E. Telephone Company
F. Puget Sound Clean Air Agency

1.03 SUBMITTALS

A. Furnish manufacturers’ technical literature, standard details, product specifications, and installation instructions for all products.
B. Submittals shall include the following:
    1. Demolition plan.
    2. Proposed landfills and recyclers.

PART 2 - MATERIALS – NOT USED

PART 3 - EXECUTION

3.01 PROJECT INFORMATION

A. The Contractor represents that it has visited the site to become familiar with the quantity and character of all materials to be demolished. The Contractor agrees that the premises were made available prior to deadline for submission of bids for whatever inspection and tests the Contractor deemed appropriate in preparation of bids.

3.02 PREPARATION FOR EXECUTION OF WORK

A. The Contractor shall submit to the Port of Tacoma a demolition plan that at a minimum addresses the following:
B. Products that are required to accomplish, or to be incorporated into, the Work of this section shall be as selected by the Contractor, subject to the approval of the Port Representative.

3.03 DEMOLITION OF FENCES AND STRUCTURES

A. Completely remove and dispose of legally off-site fences and other obstructions. All pavements designated for removal shall be broken up, loaded and disposed of by the Contractor. Care shall be taken in removing the pavement, so that damage does not occur to the existing pavement which is to remain in place and that all removals are accomplished by making a neat full depth vertical saw cut at the boundaries of the area to be removed. Adjacent materials designated to remain that are damaged by the Contractor due to his operations shall be replaced at no additional cost to the Port.

B. Blasting or other special operations necessary for the removal of an existing structure or obstruction shall be subject to the approval of the Port Representative.

3.04 DISPOSAL

A. General: All materials, except those indicated as Port of Tacoma salvage, and except those materials containing substances classified as hazardous or potentially hazardous by local, state or Federal regulating agencies, shall upon their demolition become the property of the Contractor. All such material, including those containing hazardous or potentially hazardous substances shall be removed and promptly disposed of legally away from the site and on property not owned by the Port of Tacoma, except as otherwise provided in these specifications. No material shall be disposed of in adjoining waterways or in the fill. Burning of materials in these areas falls under the jurisdiction of the Pierce County regulations and is generally forbidden under all circumstances.

B. Cleanup: After removal of structures, clean and grade the area. There shall be no debris, rubble, or litter left at the site from any of the demolition operations and the site shall be clean.

C. The Port of Tacoma encourages the salvage and recycling of materials from demolished structures. The Contractor shall salvage or recycle, in an acceptable manner to environmental agencies and the Port of Tacoma, at his option any of the materials designated for disposal.

D. Non-salvageable or non-recyclable demolition, contaminated soils and creosote debris shall be transported to a Port approved lined landfill with a Leachate Collection System.

3.05 DELIVERABLES - NOT USED

3.06 QUALITY ASSURANCE -- NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. Provide, place and finish all concrete products for this project.

B. Back Up Generator

1. Concrete equipment pad
2. Repair and restoration of paving
3. Equipment stands/racks
4. Equipment pads

1.02 THE EXTENT AND LOCATION OF “CAST-IN-PLACE CONCRETE” WORK IS SHOWN IN THE CONTRACT DOCUMENTS. GOVERNING CODES, STANDARDS, AND REFERENCES

A. American Concrete Institute (ACI)

1. ACI 211.1 - Recommended Practice for Selecting Proportions for Concrete (current edition)
2. ACI 301.1 – Specification for Hot Weather Concreting (current edition)
3. ACI 318 - Building Code Requirements for Structural Concrete (current edition)

B. American Society for Testing and Materials (ASTM)

1. ASTM C33 - Standard Specification for Concrete Aggregates (current edition)
2. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens (current edition)
3. ASTM C94 - Standard Specification for Ready-Mixed Concrete (current edition)
4. ASTM C150 - Standard Specification for Portland Cement (current edition)
5. ASTM C260 - Standard Specification for Air Entraining Admixtures for Concrete (current edition)
6. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete (current edition)
7. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures (current edition)
8. ASTM C1582 - Standard Specification for Admixtures to Inhibit Chloride- Induced Corrosion of Reinforcing Steel in Concrete (current edition)

C. International Code Council (ICC)

1. International Building Code (IBC) as adopted by the Authority Having Jurisdiction.

D. National Ready Mix Concrete Association (NRMCA);

1. NRMCA Certification of Ready Mixed Concrete Production Facilities. Quality Control (QC) Manual (current edition)
2. NRMCA Truck Mixer Manufacturer’s Bureau (TMMB) 100 – Concrete Carrier Standards (current edition)

1.03 SUBMITTALS

A. Furnish manufacturers' technical literature, standard details, product specifications, and installation instructions for all products.

B. Submittals shall include the following:

1. Mix Design:

a. Proposed design mix for each class of concrete required for this portion of the Work, including admixture proportions

b. Expected mix design results, including compressive strength, air entrainment, and slump. If test data from previous usages of the same mix design is available, include previous test results.

c. Name and address of the proposed concrete supplier

d. Grading of coarse and fine aggregate

e. Type and specification of cement

f. Component manufacturer's name and product name or catalog number

g. Component manufacturer's certification of ASTM compliance, where applicable

h. Admixture manufacturer's recommended usage and guidelines

i. For plant-mix concrete, a supplier-provided certificate showing proportions and the seven-day strength of the concrete mix being furnished

2. Contractor Quality Control Testing and Inspection: The Contractor shall perform the inspection and tests described below and, based upon the results of these inspections and tests, shall submit the specified reports to the Engineer, and shall take the action required by the Engineer

a. Sampling and Testing of Materials

b. Scales, Batching, and Recording

c. Batch Plant Control

d. Concrete Mixture

e. Inspection Before Placing

f. Vibrators

g. Curing Inspection

h. Water Protection

i. Mixer Uniformity

j. Reports

3. Concrete Batch Ticket:

a. Approved batch tickets for each load of ready-mixed concrete. Placement sequence when multiple pours are required

4. Concrete Placement:

a. Placement diagram showing extents of each class of concrete. Placement sequence when multiple pours are required

5. Finishing Procedure:

a. List of materials and tools

b. Written procedure

PART 2 - MATERIALS

2.01 MATERIAL REQUIREMENTS

A. General

1. All concrete shall meet the requirements of the current edition of the International Building Code. Where provisions of pertinent codes and standards conflict with this specification, the more stringent provisions shall govern.

2. All concrete is reinforced, unless stated otherwise. The amount of reinforcing shall not be less than the minimum required by the Code.

B. Concrete

1. Properties:

a. Concrete of the tabulated classes shall have the following properties unless specifically approved otherwise.

Class:	Minimum Compressive Strength	Minimum Sacks of Cement/C.Y.:b	Maximum Water-Cement Ratio	Slump Limits:	Additional Requirements
A	f'c = 3000 psi	6	0.45	3-1/2" max	

a The minimum compressive strengths tabulated are the strength at 28 days for ordinary concrete, or the strength at seven days for high-early-strength concrete.

b Mixes utilizing less cement may be approved upon submittal of compression test reports

c Determined by mix design

b. General intended placement types for each class uses are described in section 3.03.A.3

2. Cement:

a. All cement shall be Portland cement conforming to ASTM C150, Type I/II.

b. All cement shall be the product of one manufacturer.

c. Type I/II cement shall be used for all concrete unless specifically authorized in writing by the Engineer.

d. Silica Fume and Slag (Ground Granulated Blast Furnace) are not permitted for use in the concrete mix.

e. All classes of concrete may contain an appropriate amount of Fly Ash as a pozzolanic material.

1) Concrete mix designs including Fly Ash, shall be prepared by a certified laboratory and have the approval of the Engineer prior to use.

2) If pozzolan is used in the concrete mixture, the minimum pozzolan content shall be 15 percent by weight of the total cementitious material, and the maximum shall be 35 percent.

3. Aggregates:

a. Aggregates for standard Portland cement concrete shall conform to the quality requirements of the Standard Specifications.

b. Aggregate for lightweight concrete shall be approved prior to the mix design. Lightweight aggregate shall have a maximum dry loose weight of 70 pounds per cubic foot.

c. Concrete mix coarse aggregate shall be ASTM C33, Grade #67.

1) Maximum aggregate size for a given mix should not exceed:

2) 1/5 the dimension of non-reinforced members.

3) 3/4 the clear spacing between reinforcing bars or between reinforcing bars and forms.

4) 1/3 the depth of nonreinforced slabs on the ground.

4. Water:

a. Water used for mixing concrete shall conform to the quality requirements of WSDOT Standard Specifications, paragraph 9-25.1

5. Admixtures:

a. All admixtures shall be supplied by one manufacturer and approved by the Engineer.

b. Use all admixtures in strict accordance with the manufacturer's recommendations, including proportioning and procedures.

c. Air-Entraining Agents shall be BASF MB VR, MB AE-10, W.R. Grace product, Or Approved Equal, conforming to ASTM C260. Where guidance is not provided by the manufacturer, added to obtain 4-1/2% entrained air.

d. Water-Reducing Agents shall conform to ASTM C494, Type A for water-reducing, Type D for water-reducing and retarding, and Type E for water-reducing and accelerating.

e. Set Retarding Agents shall be BASF "Pozzolith 300R," W. R. Grace "Daratard," Or Approved Equal set-retarding admixture compliant with ASTM C494 at three to five fluid ounces per 100 pounds of cement as recommended by the manufacturer.

f. Accelerators shall be approved by the Engineer and shall comply with ASTM C494, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

C. Curing Compound

1. Use Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

D. Other Materials

1. All other materials not specifically described but required for a complete and proper installation of cast-in-place concrete shall be as selected by the Contractor subject to the approval of the Engineer.

2.02 MATERIAL HANDLING, DELIVERY, & STORAGE

A. Protection:

1. Use all means necessary to protect cast-in-place concrete materials before, during, and after installation and to protect the installed Work and materials of all other trades.

B. Replacement:

1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Port.

PART 3 - EXECUTION

3.01 PREPARATION FOR EXECUTION OF WORK

A. Inspection:

1. Prior to all Work of this section, carefully inspect the installed Work of all other trades and verify that all such Work is complete to the point where this installation may properly commence.
2. Verify that concrete may be placed to the lines and elevations indicated on the drawings with all required clearances for reinforcement. Where concrete clear cover is not shown on the drawings, ensure minimum clearances based on ACI 318 requirements.
3. Embedded Items
    a. Before placement of concrete, determine that all embedded items are firmly and securely fastened in place in the location and orientation indicated on the drawings or required.
    b. Conduit and other embedded items shall be clean and free of oil and other foreign matter such as loose coatings or rust, paint, and scale.
    c. The embedding of wood in concrete will be permitted only when specifically authorized or directed.
    d. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids.
4. Verify completion and acceptance of all inspections required by the Engineer and/or Independent Testing Agency.

B. Cleaning:

1. Thoroughly clean all areas in which concrete is to be placed. Clean and roughen existing concrete or concrete from a previous pour to provide a bondable surface. Thoroughly wet down concrete forms which have not been treated with oils, waxes, or other bond breakers prior to placing concrete.
2. Clean all transporting and handling equipment of all hardened concrete.

C. Preparation of Previously Placed Concrete for Bonded Joints

1. Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next horizontal lift by cleaning the Construction joint surface with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. Keep the surface of horizontal construction joints continuously wet for the first 12 hours during the 24-hour period prior to placing fresh concrete.
2. Prepare concrete at the side of vertical construction joints as approved by the Engineer.
3. Air-water cutting shall not be used on formed surfaces or surfaces congested with reinforcing steel.
4. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean surfaces of well bonded coarse aggregate are exposed and make up at least 10-percent of the surface area, distributed uniformly throughout the surface.
5. The surface shall be washed completely clean as the last operation prior to placing the next lift.
6. The edges of the coarse aggregate shall not be undercut.

D. Discrepancies:

1. In the event of discrepancy, immediately notify the Engineer. Do not proceed with installation until all discrepancies have been fully resolved.

E. Notification:

1. Notify the Engineer at least 48 hours in advance of concrete pour.

3.02 EXECUTION OF WORK

A. Placing Concrete:

1. General:
   a. Place concrete as soon as possible after mixing. Concrete shall be plastic and readily workable when placed in the forms. Concrete that does not reach its final position in the forms within 1-1/2 hours after the addition of cement shall not be used.
   b. The method and manner of placing concrete shall not allow segregation of the aggregates or displacement of reinforcement.
   c. Do not use aluminum conduits or tremies for pumping or placing concrete.
   d. In general, the method of depositing and compacting concrete shall be conducted to form a compact, dense, impervious concrete with the required surface and a minimum of segregation. Remove defective concrete as directed by the Engineer at no additional cost to the Port. “Plastering” will not be permitted.
2. Ready-Mixed Concrete
   a. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA QC Section 3.
   b. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94, except as otherwise specified.

c. Truck mixers, agitators, and non-agitating transporting units shall comply with NRMCA TMMB 100.

d. Ready-mixed concrete shall be placed in its final position within 1- 1/2 hours after the addition of cement.

e. Mix concrete only in such quantities as are required for immediate use and use while fresh before initial set has taken place. Concrete which has developed initial set shall not be used. Concrete which has partially hardened shall not be re-tempered or remixed.

3. Placement by Classification:

a. Class A concrete is to be used in all other reinforced members or sections.

4. Cold Weather Placement

a. Do not place concrete on frozen ground or against frosted reinforcing steel or forms.

b. Do not mix or place concrete while the atmospheric temperature is below 40°F.

5. Hot Weather Placement:

a. When job-site conditions are present or anticipated that accelerate the rate of moisture loss or rate of cement hydration of freshly mixed concrete, including an ambient temperature of 80 degrees F or higher, and an evaporation rate that exceeds 0.2 lb/ft2/h, concrete Work shall conform to all requirements of ACI 305.1.

6. Vibration of Concrete:

a. Provide suitable internal vibrating tampers for use in placing and compacting all concrete except that which is placed under water. The vibrators shall be of the type designed to be placed directly in the concrete, and their frequency of vibration shall be not less than 7,000 impulses per minute when in actual operation. The type of vibrator and its method of use shall be subject to the approval of the Engineer.

b. Vibration shall be such that the concrete becomes uniformly plastic. Insert vibrators to a depth sufficient to vibrate the bottom of each layer effectively, but do not penetrate partially hardened concrete. Do not apply the vibrators directly to steel which extends into partially hardened concrete.

c. Do not continue vibration in any one spot until pools of grout are formed. In vibrating and finishing top surfaces which are exposed to weather or wear, extreme care shall be exercised to avoid drawing water or laitance to the surface. In relatively high lifts, the top layer shall be comparatively shallow and the concrete mix shall be as stiff as can be effectively vibrated into place and properly finished. Do not use vibrators to transport or move concrete inside the form.

d. Supply a sufficient number of vibrating tampers to effectively vibrate all of the concrete placed. Hand-tamping shall be required wherever necessary to secure a smooth and dense concrete on the outside surfaces.

B. Finishing Concrete Surfaces

1. Finish concrete surfaces in accordance with the procedure specified for each type of surface.

2. Unformed Surfaces:

a. Finish U-1: the top surface of footings. The surface may contain reinforcing steel, anchor bolts, or other embedments as indicated on the drawings.

1) The surface shall be rodded across the grade strip or forms such that the resulting surface will have no irregularities, except shear keys, greater than the maximum-size aggregate. Grade strips, if used, are considered forms, and the accuracy of setting and the exposed appearance shall fall within the appropriate finish designation tolerances.

2) Clean the surface of laitance, dirt, foul water, or other deleterious material to the satisfaction of the Engineer prior to placing additional concrete. If “green cutting” air and water jets are used to remove laitance, sufficient time shall have elapsed after the pour so as not to weaken the joint by loosening the top aggregate.

b. Finish U-3: the top surface of exposed exterior sidewalks

1) The surface shall be rodded across the screeds and smoothed with a “bull float” light steel trowel and broom- finished. The general surface shall have no irregularities greater than 3/16 inch in depth or variations in grade of more than 3/8 inch in ten feet. The broom stria shall be approximately 1/8 inch in depth. The slab shall be edged or patterned with a two-inch-wide edging tool having a 3/4-inch corner radius.

C. Curing Concrete

1. General

a. Apply uniformly in continuous operation by power spray or roller according to manufacturer’s written instructions. Recoat areas subjected to heavy rainfalls within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of “Electrical Work” Work is shown in the Contract Documents. This Section includes general requirements for accomplishing electrical Work as specified herein and indicated on the Drawings.

B. Electrical hot Work may be required to be performed on portions of the electrical power distribution and utilization equipment. The Contractor and its subcontractors shall provide personal protection equipment (PPE), training, authority having jurisdiction (AHJ) safety compliance and all necessary tools for the execution of such Work.

C. Electrical Primary civil (trench, conduit, and vaults) system, and secondaries shall be installed by a qualified electrical contractor licensed in the state of Washington under RCE 19.28.

D. Contractor shall provide all labor and materials for a complete electrical system.

E. Contractor shall provide all labor and materials to install owner furnished equipment.

F. Contractor shall purchase and obtain all required electrical and mechanical permits.

G. Contractor shall coordinate all required power outages with the owner and Tacoma Public Utilities.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. FAA (Federal Aviation Administration)

B. NFPA 70: National Electrical Code (NEC)

C. NFPA 70 E: Standard for Electrical Safety in the Workplace

D. Tacoma Public Utilities

E. State of Washington Dept. of Labor & Industries.

F. Underwriters Laboratories, Inc.

G. WAC 296-45

H. State requirements for highway signage, flagging, and re-routing traffic

I. State of Washington safety rules and health standards

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittals Procedures. Furnish manufacturers’ technical literature, standard details, product specifications, and installation instructions.

B. Submittals shall include the following:

1. Review of Shop Drawings and Brochures shall not relieve the Contractor of responsibility for dimensions and/or errors that may be contained therein, or deviations from Contract Document requirements. It shall be clearly understood that the noting of some errors, but the overlooking of others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings and Brochures, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the review of the Shop Drawings and Brochures.

2. Manufacturer Approval Drawings: Equipment that is laid out, configured, or designed by manufacturer based on performance specifications only shall be submitted to the Engineer for approval prior to release of drawings for manufacturing.

C. Ordering Materials: Order materials within two (2) weeks of receiving approved submittals from the Engineer. Provide proof of order placement upon request. Failure to comply will be considered non-performance and progress payments will be suspended until proof of order placement is reviewed and accepted by the Engineer.

1.04 DRAWINGS

A. The electrical drawings are diagrammatic and are not intended to show all raceway, wiring, exact locations of equipment, terminations, or number or types of fittings required by the electrical system. Provide all related electrical Work which is specified herein, diagrammed or scheduled on the electrical drawings, required by code enforcing agencies and as indicated on other details or elevations for complete and operating electrical systems. Since the drawings of floor, wall, and ceiling installation are made at a small scale, outlets, devices, equipment, etc. are indicated only in their approximate location unless dimensioned or otherwise indicated. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned and coordinate such locations with the Work of other trades to prevent interferences. Verify all dimensions on the job. Do not scale the electrical drawings.

1.05 PRODUCTS

A. General: Products are specified by manufacturer name, description, and/or catalog number to show intended function and quality. Report discrepancies, such as discontinued equipment or catalog numbers, to the Engineer prior to bidding. If the Contractor is unable to interpret any part of the plans and/or specifications, he shall notify the Engineer, who will issue interpretation and/or additional clarifications to Bidders before the project is bid.

B. Manufacturers: Provide only equipment specified in the Contract Documents or approved by addendum. Manufacturers' catalog numbers and descriptions establish the quality of product required.

C. Warranty: Warranty shall be manufacturer’s standard or a minimum of one year unless noted otherwise in Division 26 Electrical Sections.

1.06 SUBSTITUTIONS

A. Substitutions of specified materials are not allowed without prior approval.

1.07 QUALITY ASSURANCE

A. All materials shall be new, unless noted otherwise. Properly store all materials and equipment for protection from physical damage or damage due to corrosion.

B. Review accessibility of equipment for operation, maintenance and repair prior to installation. Proceed with installation only after unsatisfactory conditions have been corrected

C. Equipment Manufacturer Qualifications: Equipment manufacturers shall have at least 10 years experience in manufacturing products and accessories similar to those for this Project, with a record of successful in-service performance.

1.08 COORDINATION AND SCHEDULING

A. Coordinate and schedule electrical Work with the Work of other trades. Every reasonable effort shall be made to prevent conflicts as to space requirements, dimensions, locations, code required working spaces, access openings, drawout and removal spaces or other matters tending to obstruct or delay the Work of other trades. All changes caused by failure to coordinate shall be made at the Contractor's expense.

1.09 SAFETY AND PROTECTION

A. Safety Measures To Be Taken: The Engineer has not been retained or compensated to provide design and construction review services relating to the Contractor's safety precautions or to the means, methods, techniques, sequences or procedures required for the Contractor to perform his Work. The Contractor will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours. The duty of the Engineer to conduct construction observations of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures, in, on or near the construction site. It shall be the Contractor's responsibility to comply with applicable safety and health regulations for construction. The Contractor shall consult with the state or federal safety inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist or whether they are or are not in compliance with state or federal regulations.

B. Protection: The Contractor shall take whatever measures are required to ensure that electrical safety and protection are maintained, including the proper covering, signage, and securing of “live” circuits.

C. Project “Electrical Safety Rules” are as follows:

1. Work on Electrical circuits operating at over 50 volts, phase to ground, or greater shall be conducted in accordance with acceptable industry safety standards.

2. Power Outages: Any essential outages required in the course of construction, whether for temporary services, cutovers, or testing, shall be closely coordinated with the Engineer and shall occur at times approved by the Port by means of shutdown notification request. Contractor shall identify all systems affected and provide copy of panel schedules of panelboards affected by shutdown notification request.

3. Electrical circuits operating at over 300 volts phase to ground, or circuits serviced by a transformer over 150 kVA, shall be de-energized before proceeding with the Work.

4. Electrical circuits shall be considered de-energized only after compliance with Lock-out Tag-out procedures and under the following conditions:

a. Switches connecting subject circuit to the energy supply are observed in the “open” position, with an air break, and locked and tagged out in accordance with Lock-out Tag-out procedures.

b. Electrically operated switches are visibly “open”, blocked or racked in the “open” position, and locked and tagged out “open”.

c. If the supply circuit break is not visible and clearly identified, the circuit shall be grounded. If the ground connection is not within sight of the Work area, the ground connection shall be locked and tagged out before proceeding with the Work.

d. Oil switches are observed “open” in a sight window and locked and tagged out “open,” or fuse carrier is removed in oil fuse cutouts and locked and tagged out “open.”

5. Use of Red Safety Tags
    a. For protection of personnel working on circuits, safety tags shall be filled out and attached to any opened switch or equipment.
    b. Safety tags shall be removed only the by the Port of Tacoma employee who placed the tag, or by another Port of Tacoma employee who has been authorized to remove the tag in writing by the employee who placed the tag. The Port of Tacoma Maintenance Electrical Systems Manager or his designated representative may authorize removal of a safety tag placed by an employee who is not available to remove the tag at the time of need only after carefully checking that the circuit is ready to be energized.
    c. Equipment with a safety tag attached shall not be operated, and connections with a safety tag attached shall not be changed.
6. Insulated cables, operated at over 300 volts to ground, shall be handled when energized only with rubber gloves tested to 22,000 volts by a Washington State approved testing laboratory.
7. Insulated cables that have been in operation shall be cut only with grounded cable shears, or shall be grounded by driving a grounded sharp tool through the shielding and the conductors before cutting.
8. All personnel working around energized electrical equipment shall comply with NFPA 70 E per equipment labels. If no label is present personnel shall wear standard insulated, non-conducting hard hats and shall wear fire retardant garments with no metallic zipper fasteners.
9. Ladders used in any electrical Work shall be of wood or fiberglass construction.
10. All panelboards, junction boxes, electrical devices and other similar equipment which is being worked on and which have exposed live wires, bus bars, or terminals operating above 50 volts shall be covered adequately for the voltage with an electrical insulating material and labeled with a “Caution” sign when Contractor personnel are not present. The Caution sign shall advise that exposed electrical parts are behind the temporary protective cover.
11. Contractors engaged on Port of Tacoma projects or working on Port of Tacoma property shall be governed by Port of Tacoma rules. The Contractor shall place their lock and tag only after Port of Tacoma Electric Shop or designee has placed a lock and tag. The Contractor shall designate a supervisor for all contract personnel and operations. This supervisor shall be on the job whenever contract operations are in progress.

D. Comply with the following procedures for medium-voltage manhole access:
1. All switching of the medium-voltage system must be approved in advance and coordinated through the Electrical Shop.
2. Schedule requests for Electrical Shop assistance a minimum of seven (7) days in advance.
3. Comply with Port of Tacoma Construction Confined Space Entry Requirements, lock and tag out procedures, and all other applicable State safety requirements.
4. Complete a confined space entry permit for each entry. Submit to the Engineer.
5. Ventilate and monitor the confined space. A top man is required at all times.

6. Complete lock and tag out once line clearance has been given, and attach locks and tags to any opened switch or equipment. Submit tags to Electrical Shop upon completion of the Work.
7. Provide effective barriers to prevent others from falling into the open vault. Close and secure vaults when not attended.
8. Comply with Port of Tacoma and State requirements for highway signage, flagging, and re-routing traffic.

E. Before entry is made into energized electrical cable vaults or manholes, an infrared tester shall be used to scan the cables and connector components. If a temperature difference of 10 degrees Fahrenheit is detected between the cable and connector components, or any reading greater than 140 degrees Fahrenheit is detected from the cables or components the entry shall not be made! The Contractor shall notify the Engineer.

1.10 ELECTRICAL SERVICE

A. Continuity of Service: Provide temporary service to existing systems as required to maintain continuous operation without reducing equipment efficiency. Coordinate the extent of temporary services with the Engineer.

B. Power Outages: Outages shall be kept to an absolute minimum. Any essential outages required in the course of construction, whether for temporary services, cutovers, or testing, shall be closely coordinated with the Engineer and shall occur at times approved by the Port of Tacoma.

1.11 DEMOLITION

A. General: De-energize circuits in demolition areas to ensure a safe condition.

B. Existing material that is not to be reused or is not requested by the Port to be retained shall be removed from the site and shall become the property of the Contractor for salvage. All materials removed from the site shall be disposed of at facilities licensed for the material.

C. In areas of where alterations are to be done, existing conduits may be reused, with the approval of the Engineer, in their original location, unless noted otherwise.

1. Wiring that is discovered with damaged or deteriorating insulation shall be replaced with new.
2. No existing conduit or wiring once removed may be reused, unless noted otherwise.

D. Remove all unused exposed conduit except where located in or above existing construction, which is not being altered and would require removal and replacement of the existing construction.

1.12 ELECTRICAL EQUIPMENT INSTALLATION

A. Comply with Division 1 General Requirements Sections for environmental regulatory requirements, quality control, construction facilities and temporary controls, traffic control, access control, and signage requirements.

B. Provide electrical connection of all owner and contractor furnished equipment having electrical requirements. Make final connections for all equipment. Refer to Division 26 Electrical for motor starters and controls furnished integrally with equipment.

1. Make electrical connections in accordance with manufacturer's written instructions, with recognized industry practices, and complying with requirements of the National Electrical Code.

2. Verify all electrical loads (voltage, phase, full load amperes, number and point of connections, minimum circuit capacity, etc.) for equipment furnished under other divisions of this specification by reviewing respective shop drawings furnished under each division.

3. Meet with each subcontractor furnishing equipment requiring electrical service to review electrical characteristics for each equipment item before rough-in begins. Report any variances from electrical characteristics noted on the electrical drawings to the Engineer before proceeding with rough-in Work.

C. National Electrical Code Compliance: Comply with applicable portions of National Electrical Code as to the type of products used and provisions for electrical power connections.

D. Underwriters Laboratories acceptance: All material and equipment within the scope of the UL Re-examination service shall be approved by Underwriters Laboratories, Inc. for the purpose for which they are used and shall bear their label.

E. Cutting and Patching: Provide and coordinate the locations of all openings required in the building construction for installation of the Work.

1. Drill penetrations required through existing concrete slabs or walls with a diamond core drill. In no case shall any structural member be cut.

2. Provide approved sleeves as required for electrical penetrations through floors and walls. Seal all openings around conduits in sleeves with a material of equal fire rating as the surface penetrated.

3. Obtain written approval from a Structural Engineer licensed in the State of Washington prior to cutting any reinforcing bars.

4. Provide weekly updated Submittal Log of all penetrations and cuts performed.

F. Equipment Bases and Fastening: Comply with seismic anchorage and bracing requirements for equipment and equipment racks.

G. Equipment Accessibility: Comply with applicable codes and install equipment to be accessible for operation, maintenance or repair. Equipment deemed inaccessible shall be reported to the Engineer, and relocated as directed.

H. Electrical Work Exposed to Weather: Provide weatherproof enclosures and corrosion protection for all ferrous metal portions of electrical Work exposed to weather, including conduit, clamps, supports, and hardware.

1. All galvanized electrical equipment exposed to the weather shall be painted to prevent leaching of zinc into the stormwater system. Paint coating shall be a minimum of 3 mils thick, and application as part of the manufacturing process is preferred over painting in the field.

1.13 EARTHWORK

A. Existing Underground Utilities: Verify, before any excavation, the location of all existing utilities in the area of new construction. Exercise extreme care with all Work adjacent to these utilities. A designated representative of the Contractor shall advise the Port of Tacoma Electrical Supervisor and Power Company where they can be contacted in any emergency.

1. Review drawings and notify the Engineer of any deviations in duct runs to avoid conflicts with existing utilities. Any changes in the Work resulting in the same quantities of trenching material shall not entitle the Contractor to any claim for an addition to this Contract.

2. The Contractor is responsible for any damage done to existing utility installations during the course of the Work. All damaged installations shall be replaced to the satisfaction of the utility or agency involved at the expense of the Contractor.

B. Comply with the Division 1 General Requirements and Division 31 Earthwork requirements for site work, including excavation, bracing and shoring, erosion control, requirements for temporary pumping equipment, backfilling, patching and paving, sod replacement, removal of surplus material, and requirements for traffic control during construction.

1.14 PROJECT FINALIZATION

A. Fully test and adjust all equipment installed under this specification and demonstrate its proper operation.

1. Testing that involves use of instruments other than meggers and volt-ohm meters shall be performed by an independent testing agency.

B. Where circuits have been added, removed or relocated on panelboards and switchboards, the Contractor shall provide to the Port as-built panel and switchboard schedules in Port standard excel format. Coordinate submittal of schedules with Port Construction Manager.

C. Present the Port with Certificate of Inspection from the Authorities Having Jurisdiction upon completion of the Work stating that all Work complies with all applicable Codes and Ordinances.

D. Comply with Division 1 General Requirements for cleaning, closeout procedures, commissioning, training, operations and maintenance manuals, and record drawings.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SECTION INCLUDED

A. Formatting manual submittals

B. Compiling product data and related information appropriate for owners maintenance and operation.

1. Modifying data as required to accurately represent completed installations.

2. Obtain and Include Owner Furnished Equipment Data in O& M for a complete package.

C. Instructing Owners personnel in maintenance, equipment, and systems operations prior to Owners acceptance of any portion or stage of the work.

D. For additional data requirements see respective specification sections.

1.02 RELATED SECTIONS

A. Coordinate related requirements specified in other parts of the Project Manual, including but not limited to the following:

1. Division 26 - Electrical

1.03 FORM OF SUBMITTALS

A. Prepare data in instructional manual form for use by owner’s personnel.

B. Format:

1. Size: 8-1/2 X 11 inches

2. Paper: 20 lb. minimum; white for typed pages

3. Tests: Manufacturers printed data or neatly type written information on 20lb paper.

4. Drawings:

a. Provide reinforced punched binder tab, bound in with text.

b. Fold oversized drawings and place in pocket glued to inside of back cover.

5. Arrange content by systems, under section numbers and sequence of table of contents is Project Manual.

6. Provide flyleaf for project and major component parts of equipment followed by typed descriptions. Provide indexed tabs.

7. Cover: Identify each volume with typed or printed title: “Operation and Maintenance Instructions”. Identify the following:

a. Title of project, names of Owner, Engineer, Contractor, Subcontractor, subject matter and completion date of Contract.

b. Identify general subject matter included in the Manual.

C. Binder:

1. Commercial quality, 8-1/2 x 11 inch, 3 ring binder with durable hardback and cleanable plastic covers

2. Maximum ring size: As suitable to content, 3 inch maximum.

3. When multiple binders are used, correlate data into related groupings.

1.04 CONTENTS OF MANUALS

A. Neatly typewritten table of contents: Arrange systematically in relation to Project Manual Table of Contents. Include following information:
   1. Project title
   2. Engineer
   3. Contractor - name of responsible principal, address and telephone.
   4. An indexed list of each product and system data sheets.
   5. Show for each product the name, address and telephone number of the responsible.
      a. Subcontractor or installer
      b. Maintenance contractor, as applicable
   6. Maintenance contractor, as applicable
   7. Clearly identify by name and other symbols products and component parts as set forth in the Contract Documents.

B. Product data:
   1. Submit original product literature only. Copies are not acceptable.
   2. Include only sheets pertinent to specific product.
   3. Annotate each sheet to:
      a. Clearly identify specific product or part installed.
      b. Clearly identify data applicable to installation
      c. Delete inapplicable information.
   4. Coordinate identification of equipment to match the construction documents.

C. Drawings:
   1. Supplement product data with Drawings required to clearly illustrate
      a. Control and flow diagrams.
      b. Relations of component parts of equipment systems.

D. Supplement product and installation data with service schedule.
   1. Organize in consistent format under separate headings for different service procedures.
   2. Instances that might affect validity of warranties and bonds.

E. Provide a copy of each warranty, bond and service contract issued.
   1. Provide information sheet for Owners personnel. Indicate:
      a. Proper procedures in event of failure.
      b. Instances that might affect validity of warranties and bonds.

1.05 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Each item of equipment and each system: Include description of unit or system and component parts. Give function, normal operating characteristics and limiting conditions. Include performance curves with engineering data and tests. Include complete nomenclature and commercial number of replaceable parts.

B. Panelboard circuit directories: Provide electrical service characteristics, controls and communications.

C. Include "as-installed color-coded" wiring diagrams.

D. Operating procedures: Include start up, break in and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown and emergency instructions. Include summer/winter, and any special operating instructions.

E. Maintenance requirements: Include routine procedures and guide for trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing and checking instructions or complete replacement, as required.

F. Provide servicing and lubrication schedule. List lubricants required.

G. Include manufacturers printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturers parts list, illustrations, assembly drawings and diagrams required for maintenance.

J. Provide as installed control diagrams by controls manufacturer.

K. Provide list of original manufacturers spare parts, current prices and recommended quantities to be maintained in storage.

L. Additional requirements: As specified in individual specifications section.

M. Provide a listing in the Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.06 INSTRUCTION OF OWNER PERSONNEL

A. Before final inspection, instruct Owners designated personnel in operation, adjustment and maintenance of products, equipment and systems at agreed upon time. Demonstrate for equipment requiring particular seasonal operation. Perform instructions for other seasons within 6 months.

1.07 SUBMITTALS

A. Submit one copy of completed volumes in final form 45 days prior to final inspection. A copy will be returned after final inspection with Construction Managers and Engineers comments. Revise content of documents as required before final submittal.

B. Submit five copies of revised volumes of data in final form within 10 days after final inspection.

1.08 PREVENTATIVE MAINTENANCE INSTRUCTIONS

A. Prepare preventative maintenance instructions. Include for each piece of equipment or system furnished, requiring periodic inspections, lubrication, adjustment and the like. Insure optimum and continued performance as originally specified.

1. Preventative maintenance instructions: Prepare on form acceptable to Owner.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Raceways

B. Wires and cables

C. Boxes

D. Wiring devices

E. Supporting devices

F. Electrical identification

PART 2 - PRODUCTS

2.01 RACEWAYS

A. Rigid metal conduit and fittings (ferrous):

1. Galvanized rigid steel conduit: UL 6; thick wall steel, hot-dip galvanized, threaded.
2. Fittings and conduit bodies: UL 514B; threaded type, galvanized, material to match conduit.

B. Flexible metal conduit and fittings:

1. Flexible metal conduit: UL 1; galvanized steel.
2. Liquidtight flexible metal conduit: UL 360; flexible metal conduit with copper bonding tape and PVC weatherproof jacket.
3. Fittings: UL 514B; galvanized steel, insulated throat.

C. Rigid nonmetallic conduit:

1. Conduit: UL 651; schedule 80 PVC.
2. Fittings and conduit bodies: UL 514B.

D. Wireway and auxiliary gutters:

1. UL 870; lay-in type, no knockouts, hinged cover, NEMA 4X stainless Steel unless otherwise indicated on Drawings.
2. Size: 10 x 10-inch minimum.
3. Hinges: Stainless steel
4. Captive Bolts and hardware: Stainless Steel

2.02 BOXES

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover and threaded hubs.

D. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

E. Device Box Dimensions: 4 inches square by 2-1/8 inches deep

F. Outdoor device Boxes: Cast construction, gasketed cover, threaded hubs, internal grounding screw, deep type for depth unless otherwise indicated or required for installation.

2.03 WIRE AND CABLE

A. Rubber-insulated building wire:

1. Exterior feeders and branch circuits: UL 44; copper, stranded conductor, 600 volt insulation, type XHHW.

B. Wiring connections and splices:

1. Use UL listed compression type connectors with insulating covers for copper wire splices and taps.

2. For 8 AWG and smaller, use insulated spring connectors with plastic caps; 3M Scotchlok, or equal.

3. For 6 AWG and larger, use UL listed compression type in-line splices. Insulate splice to 150% of conductor insulation value.

2.04 WIRING DEVICES

A. General: Specification grade and UL listed.

B. Receptacles: UL 498 and NEMA WD 1 Standard NEMA configurations as shown on Drawings. See attached cross reference for approved manufacturers and receptacle numbers.

C. Provide wet location rated “While In Use” covers for outdoor device boxes.

2.05 SUPPORTING DEVICES

A. Adequate for weight of equipment and conduit, including wiring, which they carry.

B. Conform to seismic requirements of the Current Uniform Building Code .

C. Conduit clamps, straps, and supports: Stainless Steel

D. Screw/bolt retained clamp, spring steel clips and clamps are not acceptable.

E. Support channel: Stainless Steel, 12 gauge, Uprights back-to-back 1-5/8 x 1-5/8- inch minimum size configuration, laterals 1-5/8 x 1-5/8-inch minimum size.

F. Hardware: Stainless Steel.

2.06 ELECTRICAL IDENTIFICATION

A. Nameplates: Engraved metal or phenolic with 1/4-inch white letters on black background.

B. Labels: Embossed adhesive tape, 3/8-inch, white letters on black background.

C. Wire and cable markers: Cloth markers, split sleeve or tubing type.

D. Control panel wire markers: Heat shrink tubular type, machine embossed lettering, black letters on white background.

PART 3 - EXECUTION

3.01 RACEWAY INSTALLATION

A. Size raceway as shown on the Drawings.

B. Arrange raceway to maintain headroom and present a neat appearance. Headroom to be 7'-0" minimum unless otherwise shown on Drawings.

C. Route exposed raceway parallel and perpendicular to walls and adjacent piping. In finished spaces, install EMT and conduit concealed in walls and ceiling.

D. Maintain minimum 6-inch clearance between raceway and piping. Maintain 12 inch clearance between raceway and heat sources such as flues, steam pipes, and heating appliances.

E. Arrange raceway supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using lay-in adjustable hangers, clevis hangers, or bolted split stamped stainless steel hangers.

F. Group raceway in parallel runs where practical and use rack constructed of steel support channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

G. Do not fasten raceway with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

H. Where raceways enter/exit floor, provide threaded coupling with upper end flush with finished floor. Install threaded plugs in unused conduits.

I. Use hydraulic one-shot conduit bender or factory elbows for bends in raceway larger than 1-1/4 inch size.

J. Use suitable caps to protect installed raceway against entrance of dirt and moisture.

K. Provide #10 steel wire or 1/4-inch poly rope pull string in all power and data/communication raceways, except sleeves and nipples.

L. Seal between raceway and building where raceway passes through exterior wall or rated firewall. All compounds must be UL listed for the application.

3.02 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on the Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

B. Electrical box locations shown on the Drawings are approximate unless dimensioned. Verify location of outlets in offices and work areas prior to rough-in.

C. Locate and install to maintain headroom and to present a neat appearance. Headroom to be 7-foot minimum unless otherwise shown on Drawings.

D. Do not install outlet boxes back-to-back in walls, provide 16-inch minimum separation.

E. Utilize multiple gang boxes; sectional boxes are not acceptable.

3.03 SUPPORTING DEVICES

A. Fasten hanger rods, conduit clamps, outlets, and junction boxes to equipment support structure using approved stainless steel bolts and clamps.

B. Do not use powder-actuated anchors. Do not drill, cut, or weld building structural steel members.

C. Fabricate supports from stainless steel support channel; rigidly welded or bolted to present a neat appearance. Provide polymer channel endcaps for ends of channel.

D. Install surface mounted cabinets, enclosures, and panels with a minimum of four anchors. Provide stainless steel channel supports and provide minimum 1/4-inch gap between wall and equipment.

3.04 MOUNTING HEIGHTS AND ORIENTATION

A. Outdoor areas: mount receptacles at 48 inches above finished floor unless otherwise noted.

B. Mount 120V straight blade receptacles with ground blade at bottom.

3.05 GENERAL WIRING METHODS

A. Use minimum #12 AWG for power and lighting circuits, and minimum #14 AWG for control wiring, unless otherwise noted on the Drawings.

B. Comply with NFPA 79 for all wiring in industrial control panels.

C. Do not splice feeder conductors, unless otherwise noted on the Drawings.

3.06 FIELD QUALITY CONTROL

A. Perform continuity test and insulation resistance test on all power and equipment branch circuit conductors. Verify proper phasing connections. Test both new and modified circuits with a 1,000V megger.

3.07 CIRCUIT IDENTIFICATION

A. Degrease and clean surfaces to receive nameplates and labels.

B. Provide nameplates on all panelboards, control panels, and all exterior equipment and devices.

C. Secure nameplates to equipment using stainless steel drive screws or rivets. Adhesives are not acceptable.

D. Install labels (embossed tape) on other interior boxes and devices.

E. Include power source on all nameplates and labels. (e.g. - "MDB-1/2a" for circuit 2a from panel MDB-1).

F. Provide wire markers on each conductor in panelboards, pull boxes, outlets and junction boxes, and at all load connections. Identify with branch circuit or feeder number as indicated on Drawings. For control wiring, identify with wire number indicated on the schematic or interconnection diagrams.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Building wire

B. Cable

C. Wiring connections and terminations

1.02 RELATED SECTIONS

A. Electrical Testing

1.03 REFERENCED STANDARDS

A. NEMA WC 3 Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

B. NEMA WC 7 Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

1.04 SUBMITTALS

A. Submit Shop Drawings and product data under the provisions of Section 01 33 00 – Submittal Procedures.

PART 2 - PRODUCTS

2.01 BUILDING WIRE

A. Rubber-insulated building wire: NEMA WC 3.

B. Feeders and branch circuits outdoors, underground #12 and larger: Copper stranded, conductor, 600 volt insulation, XHHW-2 stranded copper wire.

C. Control circuit conductors in control panels type MTW stranded copper minimum size #14.

D. Control circuit conductors in switchgear type SIS stranded copper.

PART 3 - EXECUTION

3.01 GENERAL WIRING METHODS

A. Use wire no smaller than 12 AWG for power and lighting circuits, and wire no smaller than 14 AWG for control wiring.

B. Use 10 AWG conductor for 20-ampere, 120-volt branch circuit home runs longer than 125 feet, and for 20-ampere, 277-volt branch circuit home runs longer than 200 feet.

C. Place an equal number of conductors for each phase of a circuit in the same raceway or cable.

D. Splice only in junction or outlet boxes.

E. Neatly train and lace wiring inside boxes, equipment, and panel boards.

F. Use equal conductor lengths for parallel circuits.

3.02 WIRING INSTALLATION IN RACEWAY

A. Pull all conductors into a raceway at the same time. Use UL-listed wire-pulling lubricant for pulling 6 AWG and larger wires.

B. Install wire in raceway after interior of building has been protected from the weather and mechanical work likely to injure conductors has been completed.

C. Completely and thoroughly swab raceway system before installing conductors.

3.03 CABLE INSTALLATION

A. Provide protection for exposed cables where subject to damage.

B. Support cables above accessible ceilings; do not rest on ceiling tiles. Use spring metal slips or plastic cable ties to support cables from structure or ceiling suspension system. Include bridle rings or drive rings.

C. Use suitable cable fittings and connectors.

3.04 WIRING CONNECTIONS AND TERMINATIONS

A. Splice only in accessible junction boxes.

B. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.

C. Use split bolt connectors for copper wire splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150% of the insulation value of conductor.

D. Thoroughly clean wires before installing lugs and connectors.

E. Make splices, taps and terminations to carry full capacity of conductors without perceptible temperature rise.

F. Terminate spare conductors with electrical tape.

3.05 FIELD QUALITY CONTROL

A. Field Inspection and Testing shall be performed as specified in section 26 08 01 Electrical Testing

B. Inspect wire and cable for physical damage and proper connection.

C. Provide Low Voltage Electrical Power Cable Insulation Test

D. Torque test conductor connections and terminations to manufacturer's recommended values.

E. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of “Grounding” Work is shown in the Contract Documents. This section includes grounding of electrical systems and equipment. Grounding requirements specified in this section may be supplemented by special requirements of systems described in other Sections.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. ASTM B8 (American Society for Testing and Materials) - Standard Specification for Concentric-Lay-Stranded Copper conductors, Hard, Medium-Hard, or Soft.

B. NFPA 70 (National Fire Protection Association) - National Electrical Code.

C. ANSI/NFPA 780 (National Fire Protection Association) - Standard for the Installation of Lightning Protection Systems.

D. ANSI/UL 96 (Underwriter's Laboratory) - Lightning Protection Components.

E. ANSI/UL 467 (Underwriter's Laboratory) - Grounding and Bonding Equipment.

1.03 SUBMITTALS

A. Submit materials data in accordance with of Section 01 33 00 - Submittal Procedures. Furnish manufacturers’ technical literature, standard details, product specifications, calibration reports, and installation instructions for all products.

B. Submittals shall include the following:

1. Submit product data for the following:
    a. Grounding conductors and cables.
    b. Grounding connectors.
    c. Grounding electrodes.
    d. Ground bus.
    e. Test wells.
    f. Exothermic weld kit
2. Grounding plans and calculations for Contractor’s designed ground system.
3. Submittal log of locations where Contractor will bond grounding conductors to structural steel.
4. Field Test Reports: Submit written test reports to include the following:
    a. Test procedures used.
    b. Test results that comply with requirements.
    c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
    d. Soil types and conditions where ground tests were performed.
5. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:

a. Test wells.

b. Ground rods.

c. Ground rings.

d. Grounding arrangements and connections for separately derived systems.

1.04 QUALITY ASSURANCE

A. Listing and Labeling: Provide electrical components, devices, and accessories that are Listed and Labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction, and marked for specific types, sizes, and combinations of conductors and connected items.

B. Comply with IEEE 837 and UL 467.

C. Comply with IEEE Std. 142 (Green Book).

D. Comply with NFPA 70.

E. Comply with IEEE C2 for overhead-line construction and medium-voltage underground construction.

F. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grounding Conductor Fittings:

a. Erico Inc.

b. Chance/Hubbell.

c. Fushi Copperweld.

d. Erico Inc.; Electrical Products Group.

e. Framatome Connectors; Division of Bain Capital.

f. Burndy Electrical; Division of Hubbell.

g. Ideal Industries, Inc.

h. ILSCO.

i. Kearney/Cooper Power Systems.

j. Lyncole XIT Grounding; Division of VFC.

k. O-Z/Gedney Co.

l. Raco, Inc.; Division of Hubbell.

m. Thomas & Betts, Electrical; Division of ABB.

n. Or Approved Equal.

2. Grounding Connectors and Rods:

a. Harger
b. Galvan
c. Erico.
d. ILSCO.
e. Lyncole XIT Grounding; Division of VFC.
f. O-Z/Gedney.
g. Raco, Inc.; Division of Hubbell.
h. Thomas & Betts; Division of ABB.
i. Or Approved Equal.

3. Acceptable Manufacturers Ground Bars
   a. Harger GBI series
   b. Erico EGBA series
   c. Or Approved Equal.

2.02 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables

B. Material: Stranded Copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation in sizes available.

D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow.

E. Grounding Electrode Conductors: Stranded cable, size as shown in drawings.

F. Underground Conductors: Bare, tinned, stranded, except as otherwise indicated.

G. Bare Copper Conductors: Assembly of stranded conductors, ASTM B 8.

H. Copper Bonding Conductors:

1. Bonding Conductor: #4 or #6 AWG, stranded copper conductor, sized per drawings.
2. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

I. Bonding Straps: Soft copper.

2.03 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Pressure Connectors: High-conductivity-plated units.

C. Bolted Connectors: Heavy-duty, copper, bolted-pressure type only.

D. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

E. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.04 GROUNDING ELECTRODES

A. Ground Rods: Solid copper clad steel, 3/4-inch diameter by 10-feet length.

PART 3 - EXECUTION

3.01 APPLICATION

A. Copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Ground Rod Clamps at Manholes: Use bolted pressure clamps with at least two bolts.

F. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Use insulated spacer; space 1 inch from wall and support from wall 6 inches above finished floor, unless otherwise indicated.

2. At doors, route the bus up to the top of the door frame, across the top of the doorway, and down to the specified height above the floor.

G. Underground Grounding Conductors: Install bare stranded copper conductor, size as indicated on drawings.

1. Copper conductor, #2/0 AWG minimum. Bury at least 24 inches below grade.

2. Ductbank Ground Conductors: Install a #4/0 AWG bare copper conductor embedded in concrete of each medium voltage ductbank. Provide a ground conductor with each medium voltage feeder circuit sized per the NEC.

3.02 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in raceways with all feeders and branch circuits unless otherwise noted.

C. Provide an exterior personal safety ground bus bar on the back side of all medium voltage switchgear.

D. Busway Supply Circuits: Install insulated equipment grounding conductor from the grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

E. Circuits: Install insulated equipment grounding conductor in branch-circuit runs from power panels or power-distribution units.

F. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal.

1. Isolate grounding conductor from raceway and from panelboard grounding terminals.

2. Terminate at equipment grounding conductor terminal of the applicable derived system or service.

G. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

3.03 BUILDING PERIMETER GROUND

A. Ground the steel framework of structures and enclosures with the ground electrode system.

3.04 INSTALLATION

A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes and connect to the service grounding electrode conductor.

1. Drive ground rods until tops are 2 inches below finished floor or final grade.

2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment.

1. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp.

2. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts.

3. Install straps only in locations accessible for maintenance.

D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building’s main service equipment, or grounding bus, to main metal water service entrances to building.

1. Connect grounding conductors to main metal water service pipes by grounding clamp connectors.

2. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting.

3. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Equipment Structures: Comply with the requirements of IEEE C2, current edition.

1. Grounding conductor shall be bare copper not less than 8 AWG.

2. Gates shall be bonded to grounding conductor with flexible bonding jumper.

3. Barbed wire shall be bonded to the grounding conductor.

3.05 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment Grounding Conductor Terminations: For #8 AWG and larger, use pressure-type grounding lugs. #10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

D. Non-contact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Provide flexible grounding strap mounted to raceway exterior where raceway crosses a seismic joint.

1. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing.
2. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.

F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values.

G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the grounding conductor.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.06 IDENTIFICATION

A. Identify grounding system components as required by the Authority Having Jurisdiction and as specified in Section 26 05 53 - Electrical Identification.

3.07 FIELD QUALITY CONTROL

A. All ground system test shall be performed in the presence of the Engineer.

B. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal and at individual ground rods. Make tests at ground rods before any conductors are connected.

a. Measure ground resistance no fewer than two full days after last trace of precipitation and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

b. Test by one of the following methods for resistance measurement, and correct any deficiencies detected during testing:

1) Perform fall of potential test per IEEE Standard No. 81, Section 9.04 on the main grounding electrode or system for each substation and building.

2) Perform the two-point method test per IEEE No.81 Section 9.03 to determine the ground resistance between the main grounding system and all major electrical equipment frames, system neutral and/or derived neutral points.

3) Perform ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point. Conduct test by passing a minimum of ten amperes dc current between ground reference system and the ground point to be tested. Measure voltage drop and calculate resistance by voltage drop method.

c. Test Requirements:

1) Equipment Rated 500 kVA and Less: 10 ohms.

2) Equipment Rated 500 to 1000 kVA: 5 ohms.

3) Equipment Rated More Than 1000 kVA: 2 ohms.

4) Power Distribution Units or Panelboards Serving Electronic Equipment: 2 ohms.

5) Substations, substation manholes, and Pad-Mounted Switching Equipment: 1 ohms.

6) Manhole Grounds: 10 ohms.

d. Excessive Ground Resistance: If resistance to ground exceeds specified values at any single ground location and as a collective ground system, notify Engineer promptly and include recommendations to reduce ground resistance.

4. Record test results. Provide bi-weekly Ground Resistance Test Report results to Engineer.

C. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes.

1. Identify each ground rod by letter in alphabetical order, and key to the record of tests and observations.

2. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of “Hangers and Supports for Electrical Systems” Work is shown in the Contract Documents. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

B. Definitions

1. EMT: Electrical metallic tubing.
2. IMC: Intermediate metal conduit.
3. RMC: Rigid metal conduit.

1.02 GOVERNING CODES, STANDARDS, AND REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

1. ASTM (American Society for Testing and Materials)
   a. ASTM A325 – Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
   b. ASTM A36/A36M – Carbon Structural Steel
   c. ASTM A780 – Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
   d. ASTM A1011/A1011M – Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low- Alloy with Improved Formability, and Ultra-High Strength
2. AWS (American Welding Society)
   a. AWS D1.1/D1.1M – Structural Welding Code – Steel
3. MSS (Manufacturers Standardization Society of the Valve and Fittings Industry)
   a. MSS SP-58 Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application and Installation
4. MFMA (Metal Framing Manufacturers Association)
   a. MFMA-4 Metal Framing Standards Publication
5. NECA (National Electrical Contractors Association)
   a. NECA 1 – Standard Practice of Good Workmanship in Electrical Construction
   b. NECA 101 – Standard for Installing Steel Conduits (Rigid, IMC, EMT)
6. NFPA (National Fire Protection Association)
   a. NFPA 70 (National Fire Protection Association) – National Electrical Code
7. OSHA (Occupational Safety & Health Administration)

a. OSHA 29 CFR 1910.7 – Occupational Safety and Health Standards – Definition and requirements for a nationally recognized testing laboratory

8. SSPC (The Society for Protective Coatings)

a. SSPC-PA 1 – Shop, Field, and Maintenance Painting of Steel

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittal Procedures. Furnish manufacturer's technical literature, standard details, project specifications, and installation instructions for all products.

B. Submittals shall include the following:

1. Product Data: For the following:

a. Steel slotted support systems.

b. Nonmetallic slotted support systems.

2. Shop Drawings: Signed and sealed by a qualified Professional Engineer registered in the State of Washington. Show fabrication and installation details and include calculations for the following:

a. Trapeze hangers. Include Product Data for components.

b. Galvanized Steel slotted channel systems. Include Product Data for components.

c. Stainless Steel slotted channel systems. Include Product Data for components.

d. Nonmetallic slotted channel systems. Include Product Data for components.

e. Equipment supports.

3. Field quality-control reports.

1.04 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authority having jurisdiction.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Comply with NFPA 70.

1.05 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together in Division 3 Concrete.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.06 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Wind-Restraint Loading:

1. Basic Wind Speed: 85mph.

PART 2 - PRODUCTS

2.01 SUPPORT ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper B-Line, Inc.
2. ERICO International Corporation.
3. Thomas & Betts Corporation.
4. Unistrut; Atkore International.
5. G-Strut; Gregory Industries.
6. Or Approved Equal.

B. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. 1-5/8 inch x 1-5/8 inch cross section.
2. Formed from 0.1046 inch thick steel.
3. Slots at maximum of 2 inches on center in webs, and flange edges turned toward web.
4. Materials: 316 Stainless Steel
5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
6. Channel Dimensions: Selected for applicable load criteria.

C. Raceway and Cable Supports: All raceway and cable supports for exterior applications shall be 316 stainless steel.

D. Conduit Support Devices: 316 Stainless steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: 316 stainless steel plates, shapes, and bars.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type 316 stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Cooper B-Line, Inc.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti, Inc.
4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
5) MKT Fastening, LLC.
6) Or Approved Equal

2. Clip type conduit fasteners are NOT allowed. All fasteners and clamps for conduit raceway support shall use mechanical bolted type hardware.
3. Concrete Inserts: 316 Stainless Steel or malleable-iron, slotted support system units; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: 316 Stainless Steel
5. Through Bolts: 316 Stainless Steel, hex head, and high strength.
6. Toggle Bolts: All-stainless steel springhead type.
7. Hanger Rods: Threaded 316 Stainless Steel.

2.02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: All raceway, box and cable supports shall be 316 Stainless Steel.

PART 3 - EXECUTION

3.01 GENERAL

A. Coordinate concrete bases with building structural system

3.02 APPLICATION

A. Locations:

1. Indoors Locations: Galvanized Steel products.
2. Outdoors and Damp Locations: 316 Stainless Steel products.
3. Corrosive Locations: 316 Stainless Steel.

B. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for RMC as required by NFPA 70. Minimum rod size shall be 3/8 inch in diameter.

D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with 3/8 in rod minimum and 1-5/8 inch square preformed steel slotted channel support system, sized so conduit capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps approved for application by an agency acceptable to the authority having jurisdiction.

E. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future loads within specified loading limits.

3.03 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified by applicable Engineer of Record.

C. Raceways shall not be supported from ducts, pipes or other systems foreign to the electrical installation. The entire electrical installation shall be kept independent from any other trade.

D. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structure members, as permitted in NFPA 70.

1. Raceways shall be supported with heavy-duty on-hole pressed steel straps on interior surfaces.

2. Support pendent mounted raceways on 3/8 inch rod with pear shaped hanger or trapeze type hanger with 3/8 inch rod minimum and 1-5/8 inch square pre-formed channel and pipe clamps.

3. Parallel surface mounted raceways shall be supported from 1-5/8 inch pre- formed channel and pipe clamps.

4. Multiple conduit runs shall be grouped and neatly racked on trapeze hangers with spare room for minimum (2) ¾ inch future conduits.

E. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Determination shall be weight of supported components plus 200 lb.

F. Equipment and Hanger Restraints:

1. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.

G. Install cables so they do not bend across edges of adjacent equipment or building structure.

H. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment- mounting channels are attached to wall.

2. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

3. Attachment to New Concrete: Bolt to channel type concrete inserts or use expansion anchors.

4. Attachments to Existing Concrete: Use expansion anchors.

5. Holes for Expansion Anchors in Concrete: Drill at locations and to depths that avoid reinforcing bars.

6. To Metal Stud Structures: Fasten with sheet metal screw or bolted fasteners.
7. To Structural Walls or Slabs: Fasten with steel expansion shells and bolts. Provide flush concrete insert for multiple raceway support system.
8. Structural Steel: Bolt to heavy duty beam clamps on flanges of beams and columns, or on upper truss chords or bar joists.
9. Architectural Walls or Masonry Walls: Fasten with toggle bolts or molly screws.
10. Provide flush concrete insert for multiple raceway support system.
11. Attachments to Wood Structural Members: Install bolts through members.
12. Attachments to Hollow Walls: Bolt to slotted steel channels fastened to wall with expansion anchors.

I. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the Structural Engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.04 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.05 CONCRETE BASES

A. Comply with Section 03 30 00 - "Cast in Place Concrete."

B. Construct concrete bases of dimensions indicated. Concrete bases must not be less than 4” larger in both directions than supported unit to ensure anchors will be a minimum of 10 bolt diameters from edge of the base.

C. Use 3000-psi, 28-day compressive-strength concrete.

D. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.06 ADJUSTING

A. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.07 PAINTING

A. Touchup: Clean field welds and abraded areas.
   1. Galvanized Steel: Apply cold galvanizing for exposed steel surfaces.
   2. 316 Stainless Steel Surfaces: Clean bolted connections, and abraded areas.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Related Sections include the following: Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior duct banks, manholes, and underground utility construction.

1.03 DEFINITIONS

A. LFMC: Liquidtight flexible metal conduit.

B. RGSC: Rigid galvanized steel conduit.

C. RNC: Rigid nonmetallic conduit.

D. RSC: Rigid steel conduit.

1.04 SUBMITTALS

A. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work. Custom enclosures and cabinets.

1. For handholes and boxes for underground wiring, including the following:

a. Duct entry provisions, including locations and duct sizes.

b. Frame and cover design.

c. Grounding details.

d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

e. Joint details.

B. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members in the paths of conduit groups with common supports.

C. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 26, Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the cabinet or enclosure will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will retain its enclosure characteristics, including its interior accessibility, after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Qualification Data: For professional engineer and testing agency.

E. Source quality-control test reports.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

1. Comply with NEMA RN 1.

2. Coating Thickness: 0.040 inch minimum.

C. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.

2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch with overlapping sleeves protecting threaded joints.

D. Joint Compound for Rigid Steel Conduit: Listed for use in cable connector assemblies and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.02 NONMETALLIC CONDUIT AND TUBING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Arnco Corporation.

2. CANTEX Inc.

3. CertainTeed Corp.; Pipe & Plastics Group.

4. Condux International, Inc.

5. Electri-Flex Co.

6. Lamson & Sessions; Carlon Electrical Products.

7. Manhattan/CDT/Cole-Flex.

8. RACO; a Hubbell Company.

9. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Type EPC-80-PVC, unless otherwise indicated.

C. LFNC: UL 1660.

D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

E. Fittings for LFNC: UL 514B.

2.03 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Arnco Corporation.
2. Endot Industries Inc.
3. IPEX Inc.
4. Lamson & Sessions; Carlon Electrical Products.

B. Description: Comply with UL 2024; flexible type, approved for general-use installation.

2.04 METAL WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements.

C. Description: Stainless Steel Sheet metal sized and shaped as indicated, NEMA 250, Type 4X unless otherwise indicated.

D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

E. Wireway Covers: painted steel indoors, 316 SS outdoors, Hinged type and flanged-and-gasketed type in wet areas.

2.05 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. EGS/Appleton Electric.
3. Erickson Electrical Equipment Company.
4. Hoffman.
5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
6. O-Z/Gedney; a unit of General Signal.
7. Robroy Industries, Inc.; Enclosure Division.
8. Scott Fetzer Co.; Adalet Division..

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

C. Small Sheet Metal Pull and Junction Boxes: NEMA 12 indoors, NEMA 4X outdoors.

D. Hinged-Cover Enclosures: NEMA 250, Type 12 indoor type 4X outdoor, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: painted Steel indoors, 316 Stainless Steel outdoors.
2. Nonmetallic Enclosures: FRP.

E. Cabinets:

1. NEMA 250, Type 12 indoors, Type 4X, 316 Stainless Steel outdoors, box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Painted steel indoors, 316 SS outdoors, Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

2.06 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Description: Comply with SCTE 77.

1. Color of Frame and Cover: Gray, ANSI 61.
2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, as indicated for each service.
6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
7. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    a. Armorcast Products Company.
    b. Carson Industries LLC.
    c. CDR Systems Corporation.
    d. NewBasis.
    e. Old Castle
    f. Quazite

2.07 SLEEVES FOR RACEWAYS

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.08 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

1. Tests of materials shall be performed by an independent testing agency.

2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.

3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit.

2. Concealed Conduit, Above ground: Rigid steel conduit.

3. Underground Conduit: RNC, Type EPC-80-PVC, direct buried, unless otherwise noted.

4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4X.

6. Application of Handholes and Boxes for Underground Wiring:

a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Non-deliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.

b. Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Non-deliberate Loading by Vehicles: Polymer-concrete units, SCTE 77, Tier 8 structural load rating.

c. Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with 3000-lbf

B. Comply with the following indoor applications, unless otherwise indicated: vertical loading.

1. All above ground conduits shall be RGSC type.

2. All underground factory elbows shall be PVC coated RGSC.

3. All conduits making transition from underground to above ground shall be PVC coated RGSC.

4. Boxes and Enclosures: NEMA 250, Type 4X, stainless steel in damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.

3.02 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hat- water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated

H. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.

2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.

3. Change from nonmetallic raceway to rigid steel conduit before rising above the floor.

I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than # 4 AWG.

K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

L. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

2. Where otherwise required by NFPA 70.

3.03 INSTALLATION OF MINOR UNDERGROUND CONDUIT

A. For major underground conduit installation, greater than 50 feet, comply with Division 26 Section “Underground Ducts and Raceways for Electrical Systems.”

1. All buried conduit shall be 6” below bottom of slab (if applicable). No conduits shall be encased in floor slabs.

B. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earthwork" for pipe less than 6 inches.
2. Install backfill as specified in Division 31 Section "Earthwork." in nominal diameter.
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand-tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earthwork."
4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. All stub-ups shall have threaded coupling set flush with floor. Plus those that are not in use. Install insulated grounding bushings on terminations at equipment.
5. Warning Planks: Bury warning planks approximately 12 inches above direct buried conduits, placing them 24 inches o.c. Align planks along the width and along the centerline of conduit.

3.04 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finish grade.

D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.

E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.05 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to finishes recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touch up coating as recommended by manufacturer.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks.
2. Handholes and boxes.
3. Manholes.

B. This section applies to power and communications systems.

1.03 DEFINITION

A. RNC: Rigid nonmetallic conduit.

1.04 SUBMITTALS

A. Product Data: For the following:

1. Duct-bank materials, including reinforcing materials, separators and miscellaneous components.
2. Ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
3. Accessories for manholes, handholes, pull boxes, and other utility structures.
4. Warning tape.

B. Shop Drawings for Precast or Factory-Fabricated Underground Utility Structures: Include plans, elevations, sections, details, attachments to other work, and accessories, including the following:

1. Duct entry provisions, including locations and duct sizes.
2. Reinforcement details.
3. Frame and cover design and manhole frame support rings.
4. Ladder.
5. Grounding details.
6. Dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
7. Joint details.

C. Shop Drawings for Factory-Fabricated Handholes and Boxes Other Than Precast Concrete: Include dimensioned plans, sections, and elevations, and fabrication and installation details, including the following:

1. Duct entry provisions, including locations and duct sizes.
2. Cover design.
3. Grounding details.

4. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
5. Ladder cover details.

D. Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.

1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

E. Product Certificates: For concrete and steel used in precast concrete manholes, handholes, and pull boxes as required by ASTM C 858.

F. Qualification Data: For professional engineer and testing agency.

G. Source quality-control test reports.

H. Field quality-control test reports.

I. All covers shall be traffic rated for heavy trucks.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Comply with ANSI C2.

C. Comply with NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver ducts to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

B. Store precast concrete and other factory-fabricated underground utility structures at project site as recommended by manufacturer to prevent physical damage. arrange so identification markings are visible.

C. Lift and support precast concrete units only at designated lifting or supporting points.

1.07 PROJECT CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Engineer no fewer than five days in advance of proposed interruption of electrical service.

2. Do not proceed with interruption of electrical service without Engineer’s written permission.

1.08 COORDINATION

A. Coordinate layout and installation of ducts, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field.

B. Coordinate elevations of ducts and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by the Engineer.

1.09 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

B. Furnish cable-support stanchions, arms, insulators and associated fasteners and accessories in quantities equal to 5 percent of quantity of each item installed.

PART 2 - PRODUCTS

2.01 CONDUIT

A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.

B. RNC: NEMA TC 2 Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B, Unless otherwise noted.

C. Liquid-tight flexible metallic conduit.

2.02 NONMETALLIC DUCTS AND DUCT ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or other equal manufacturers.

1. Cantex, Inc.
2. CertainTeed Corp.; Pipe & Plastics Group.
3. Condux International, Inc.
4. ElecSys, Inc.
5. Electri-Flex Company.
6. IPEX Inc.
7. Lamson & Sessions; Carlon Electrical Products.
8. Manhattan/CDT; a division of Cable Design Technologies.
9. Spiraduct/AFC Cable Systems, Inc.

B. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacing indicated while supporting ducts during concreting or backfilling.
2. Warning Tape: Underground-line warning tape specified in Division 16 Section “Electrical Identification” for power and communications systems.

2.03 PRECAST CONCRETE HANDHOLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or other equal manufacturer.

1. Oldcastle Precast Group
2. Columbia Precast Products.
3. Riverton Concrete Products; a division of Cretex Companies, Inc.
4. Utility Concrete Products, LLC.

B. Comply with ASTM C 858 for design and manufacturing processes.

C. Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A153 and ASTM A123.

D. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.

1. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.

2. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

3. Cover Legend: Molded lettering, “ELECTRICAL” or COMMUNICATIONS.”

4. Configuration: Units shall be designed for flush burial and have closed bottom.

5. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.

a. Type and size shall match fittings to duct or conduit to be terminated.

b. Fittings shall align with elevations of approaching ducts and be located near interior corners of handholes to facilitate racking of cable.

6. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.04 PRECAST MANHOLES

A. General Use Manholes

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or other equal manufacturer.

a. Oldcastle Precast Group

b. Columbia Precast Products.

c. Riverton Concrete Products; a division of Cretex Companies, Inc.

d. Utility Concrete Products, LLC.

B. Comply with ASTM C 858, with structural design loading as specified in Part 3 "Underground Enclosure Application" Article and with interlocking mating sections, complete with accessories, hardware, and features.

1. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12 inches vertically and horizontally to accommodate alignment variations.

a. Windows shall be located no less than 6 inches from interior surfaces of walls, floors, or roofs of manholes, but close enough to corners to facilitate racking of cables on walls.

b. Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.

c. Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.

2. Duct Entrances in Manhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
    a. Type and size shall match fittings to duct or conduit to be terminated.
    b. Fittings shall align with elevations of approaching ducts and be located near interior corners of manholes to facilitate racking of cable.
3. Manhole Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and locking provisions.
4. Cover Legend: Molded lettering, “ELECTRICAL” or “COMMUNICATIONS.”

C. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

2.05 PULL BOXES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Armorcast Products Company.
2. Carson Industries LLC.
3. CDR Systems Corporation.
4. Hubbell Power Systems; Lenoir City Division.
5. New Basis.

B. Description: Comply with SCTE 77.
1. Color: Gray.
2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC" or “COMMUNICATIONS.”
6. Direct-Buried Wiring Entrance Provisions: Knockouts equipped with insulated bushings or end-bell fittings, selected to suit box material, sized for wiring indicated, and arranged for secure, fixed installation in enclosure wall.

C. Polymer Concrete Handholes and Boxes with Polymer Concrete Cover: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.

2.06 UTILITY STRUCTURE ACCESSORIES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Bilco Company
2. Hubbell Power Systems.

3. McKinley Iron Works, Inc.
4. NewBasis.
5. Oldcastle Precast Group.
6. Riverton Concrete Products; a division of Cretex Companies, Inc.
7. Strongwell Corporation; Lenoir City Division.
8. Underground Devices, Inc.
9. Utility Concrete Products, LLC.
10. Utility Vault Co.

B. Ferrous metal hardware, where indicated, shall be hot-dip galvanized complying with ASTM A 153 and ASTM A 123.

C. Manhole Frames, Covers, and Chimney Components: Comply with structural design loading specified for manhole.

1. Frame and Cover: Weatherproof, gray cast iron complying with

a. ASTM A 48/A 48M, Class 30B with milled cover-to-frame bearing surfaces; diameter, 29 inches

Special Covers: Recess in face of cover designed to accept finish material in paved areas.

2. Cover Legend: Cast in. Selected to suit system.

a. Legend: "ELECTRIC-LV" for duct systems with power wires and cables for systems operating at 600 V and less.

b. Legend: "ELECTRIC-HV" for duct systems with medium-voltage cables.

c. Legend: "COMMUNICATIONS" for communications, data, and telephone duct systems.

3. Manhole Chimney Components: Precast concrete rings with dimensions matched to those of roof opening.

a. Mortar for Chimney Ring and Frame and Cover Joints: Comply with ASTM C 270, Type M, except for quantities less than 2.0 cu. ft. where packaged mix complying with ASTM C 387, Type M, may be used.

D. Manhole Sump Frame and Grate: ASTM A 48/A 48M, Class 30B, gray cast iron.

E. Pulling Eyes in Concrete Walls: Eyebolt with reinforcing-bar fastening insert, 2- inchdiameter eye, and 1-by-4-inch bolt.

1. Working Load Embedded in 6-Inch, 4000-psi Concrete: 13,000-lbf minimum tension.

F. Pulling Eyes in Non-concrete Walls: Eyebolt with reinforced fastening, 1-1/4-inch diameter eye, rated 2500-lbf Minimum tension.

G. Pulling-In and Lifting Irons in Concrete Floors: 7/8-inch-diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.

1. Ultimate Yield Strength: 40,000-lbf shear and 60,000-lbf tension.

H. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch ID by 2-3/4 inches deep, flared to 1-1/4 inches minimum at base.

1. Tested Ultimate Pullout Strength: 12,000 lbf minimum.

I. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steelwedge type with stainless-steel expander clip with 1/2-inch bolt, 5300-lbf rated pullout strength, and minimum 6800-lbf rated shear strength.

J. Cable Rack Assembly: Steel, hot-dip galvanized, except insulators.

1. Stanchions: T-section or channel; 2-1/4-inch nominal size; punched with 14 holes on 1-1/2-inch centers for cable-arm attachment.

2. Arms: 1-1/2 inches wide, lengths ranging from 3 inches with 450-lb minimum capacity to 18 inches with 250-lb minimum capacity. Arms shall have slots along full length for cable ties and be arranged for secure mounting in horizontal position at any vertical location on stanchions.

3. Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.

K. Cable Rack Assembly: Nonmetallic. Components fabricated from nonconductive, fiberglass-reinforced polymer.

1. Stanchions: Nominal 36 inches high by 4 inches wide, with minimum of 9 holes for arm attachment.

2. Arms: Arranged for secure, drop-in attachment in horizontal position at any location on cable stanchions, and capable of being locked in position. Arms shall be available in lengths ranging from 3 inches with 450-lb minimum capacity to 20 inches with 250-lb minimum capacity. Top of arm shall be nominally 4 inches wide, and arm shall have slots along full length for cable ties.

L. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F. Capable of withstanding temperature of 300 deg F without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.

M. Portable Manhole Ladders: UL-listed, heavy-duty fiberglass specifically designed for portable use for access to electrical manholes. Minimum length equal to distance from deepest manhole floor to grade plus 36 inches. Three required.

N. Cover Hooks: Heavy duty, designed for lifts 60 lb and greater. Six required.

PART 3 - EXECUTION

3.01 UNDERGROUND DUCT APPLICATION

A. Ducts for Electrical Cables over 600 V: RNC, NEMA Type EPC-80-PVC, in reinforced concrete-encased duct bank, unless otherwise indicated.

B. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-80-PVC, in direct-buried duct bank, unless otherwise indicated.

C. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-80-PVC, in direct-buried duct bank, unless otherwise indicated.

D. Underground Ducts for Telephone, Communications, or Data Cables: RNC, NEMA Type EPC-80-PVC, in reinforced concrete-encased duct bank, unless otherwise indicated.

3.02 UNDERGROUND ENCLOSURE APPLICATION

A. Handholes and Pullboxes for 600 V and Less, Including Telephone, Communications, and Data Wiring:

1. Units in Roadways, parking lots and other Deliberate Traffic Paths: Precast concrete. AASHTO HB 17, H-20 structural load rating.

2. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Non-deliberate Loading by Heavy Vehicles: Precast concrete, AASHTO HB 17, H-20, polymer concrete, SCTE77, tier 15 structural load rating.

B. Manholes: Precast concrete.

1. Units Located in Roadways and Other Deliberate Traffic Paths by Heavy or Medium Vehicles: H-20 structural load rating according to AASHTO HB 17.

3.03 EARTHWORK

A. Excavation and Backfill: Comply with Division 31 Section "Earthworks."

B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.

D. Do not cut existing pavement in the path of underground ducts and utility structures. Jack and bore under existing roadways and driveways as indicated.

3.04 DUCT INSTALLATION

A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.

B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 25 feet , both horizontally and vertically, at other locations, unless otherwise indicated.

C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.

D. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use

1. Begin change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct line slope and without forming a trap in the line.

2. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to manhole or handhole.

3. Grout end bells into structure walls from both sides to provide watertight entrances.

E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition.

F. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.

G. Pulling Cord: Install 100-lbf- test nylon cord in ducts, including spares.

H. Direct-Buried Duct Banks:

1. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.

2. Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.

3. Excavate trench bottom to provide firm and uniform support for duct bank.

4. Install backfill as specified in Division 31, “Earthmoving.”

5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction.

6. Install ducts with a minimum of 3 inches between ducts for like services and 6 inches between power and communications ducts.

7. Depth: Install top of duct bank below finished grade, as scheduled herein, unless otherwise indicated.

a. Primary Feeder and Service Lateral Duct– 36”

b. 480/277V, 208/120V and Communications Duct – 24”

8. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.

b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.05 GROUNDING

A. Ground underground ducts and utility structures according to Division 26 Section “Grounding and Bonding for Electrical Systems.”

3.06 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.

2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.

3. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 05 26 Section "Grounding and Bonding for Electrical Systems."

B. Correct deficiencies and retest as specified above to demonstrate compliance.

C. Prepare test and inspection reports.

3.07 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of “Electrical Identification” Work is shown in the Contract Documents. This section includes identification of electrical materials, equipment, and installations.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. ANSI/IEEE C2 - National Electrical Safety Code

B. NFPA 70 (National Fire Protection Association) - National Electrical Code, References

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 - Submittal Procedures. Furnish manufacturers’ technical literature, standard details, product specifications, and installation instructions for all products.

B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Submittals shall include the following:

1. Product Data for each type of product specified.

2. Schedule of identification nomenclature to be used for identification signs and labels.

1.04 QUALITY ASSURANCE

A. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

B. Comply with ANSI C2, ANSI A13.1., ANSI Z535.4, 29 CFR 1910.144 and 29 CFR 1910.145.

C. Comply with Port of Tacoma standards for electrical equipment identification.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.05 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 STANDARD PRODUCTS

A. Manufacturer’s standard products with colors prescribed by ANSI A13.1, NFPA 70, and these Specifications. Only temporary markings that are removable without damaging finish are permitted on equipment.

1. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Install labels and nameplates parallel to equipment lines. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
2. Provide engraved laminated phenolic plastic or melamine label for equipment as noted below. Securely attach engraved labels with blunt end, self-tapping stainless steel screws with blunt ends. Sheet metal screws are not allowed. Provide white letters on black background for normal power, white letters on red background for emergency power.
    a. Provide 5/8-inch minimum height letters on the following equipment:
        1) Panelboards, provide labels and warning signs. Secure nameplates to inside surface of door where panel is recessed in finished locations.
        2) Switchboards/distribution centers, motor control centers and power centers, padmounted transformers
        3) Secondary feeder breakers in distribution equipment
        4) Automatic and manual transfer switches. Labels shall include both normal and emergency source and load.
        5) Special equipment housed in cabinets, on outside door
        6) Terminal junction boxes and data gathering panels
        7) Cable trays
        8) UPS equipment
    b. Provide 1/4-inch minimum height letters on the following equipment:
        1) Disconnects and starters for motors on fixed appliances and starters in MCCs
        2) Motor controllers and VFDs.
        3) Enclosed switches and circuit breakers
        4) Low voltage transformers
        5) Feeder circuit breakers in switchboards, switchgear, and distribution panelboards. Circuit breakers shall be labeled with destination panel name or load.
        6) Duplex receptacles (self adhesive labels indicating panel and circuit number)
        7) Local control panels
        8) Raceways and junction boxes
        9) Instrumentation Labels
    c. Refer to table and descriptions in subparagraphs below for acceptable labeling procedure:

SECTION	TITLE	LABLE TYPES														
		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
26 05 26	Grounding			⅝		X										

26 05 33	Raceways and Boxes															X
26 05 43	Underground Ducts and Manholes						X		X	X	X	X			X	
26 24 16	Panelboards			½												
26 27 16	Cabinets and Enclosures			⅜												
26 43 13	Transient Voltage Suppression			⅜												

B. Heat-shrink preprinted tubes, flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 degree F. Comply with UL 224.

C. Preprinted, flexible, self-adhesive vinyl label laminated with a clear weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

D. Engraved melamine plastic laminate flat stock, 1/16-inch minimum thickness for sizes up to 15 square inches. Use 1/8-inch minimum for sizes larger than 15 square inches. Black with white letters for normal power systems and red with white letters for emergency power systems, with height as shown in table above unless specified otherwise. UV-inhibited when used outdoors. Secure with stainless steel drive screws, stainless steel self-tapping screws or stainless steel oval-head 6-32 screws tapped into enclosure, or with stainless steel bolts with elastic stopnut.

E. Adhesive-backed plastic machine-printed labels, white with black letters. Indicate panel name and circuit number(s).

   1. For Raceway at more than 600V, provide black letters on an orange field label with the legend, “HIGH VOLTAGE”. Indicate feeder number.

F. Plain-colored vinyl adhesive tape, 3-mil minimum by 1-inch wide minimum. Apply 1/2-inch minimum over-wrap through 2-inch minimum length.

G. Engraved plastic melamine laminate flat stock. 1/16 inch minimum thickness for sizes up to and including 15 square inches, 1/8” thick for larger than 15 square inches. White background with black letters for normal power, red background with white letters for emergency power. Holes at each end for attachment with nylon ty-wraps.

H. Not used

I. Underground line warning tape with pre-printed warning message identifying type of system. Material shall be pigmented polyolefin, continuous-printed on one side, and compounded for unlimited life when direct buried. 6-inch minimum width by 4- mils thick. Tensile strength of 1750 psi.

   1. Inscriptions for Red-Colored Tapes: ELECTRICAL LINE, HIGH VOLTAGE.

J. Underground metallic line-warning tape with pre-printed warning message identifying type of system. Material shall be detectable three-layer laminate consisting of printed pigmented polyolefin, a solid aluminum-foil core with a clear protective film that allows inspection of the continuity of the conductive core, and compounded for unlimited life when direct buried. Use when metal-detection of line is required on Medium Voltage Systems. 6-inch minimum width by 4-mils thick.

1. Inscriptions for Red-Colored Tapes: “CAUTION: MEDIUM VOLTAGE ELECTRICAL LINE BELOW”

K. Warning signs: Baked Enamel on aluminum plate, punched or drilled for fasteners, with colors, legend, and size required for applications. ¼-inch grommets in corners for mounting. Minimum nominal size of 7 by 10 inches with 0.040-inch minimum thickness. OSHA standard wording where approved. Custom wording if required. Secure with non-corrosive fasteners.

1. Where applicable, provide labels for multiple power source warning: “DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES”

L. Warning labels: Self-adhesive, multicolor, flexible pressure-sensitive vinyl conforming to OSHA “Danger” and “Caution” standards. 2½ x1¾” minimum with black letters on yellow background. Label shall read: “WARNING! DO NOT USE AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL - CABLES ADDED AFTER INITIAL INSTALLATION REQUIRE POS/F & I APPROVAL.”

1. Where applicable, provide labels for multiple power source warning: “DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES”

M. Stencils: Machine-punched patterns, nonfading waterproof paint with color and formulation appropriate for material and location. Minimum letter height shall be 1 inch.

N. Adhesive-backed metal labels manufactured with testing agency logo. Punched or engraved with actual settings and date. Label shall be 1/16-inch minimum thickness for sizes up to 15 square inches. Use 1/8-inch minimum for sizes larger than 20 square inches. Black with white letters for normal power systems and red with white letters for emergency power systems, with height as shown in table above unless specified otherwise.

O. Stainless-steel machine or hand-stamped wire marker plates with one hole at each end for attachment with non-corrosive fasteners that do 0.010-inch minimum thickness (for outdoor application).

P. Adhesive machine-printed plastic tape, cut to length, black with white letters unless specified otherwise. 3/8-inch minimum width of tape in unfinished areas only. Provide white lettering on red background when served by an emergency source.

2.02 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Floor Marking: Coordinate with the Port Electric Shop for painting working clearances on the floor in front of the equipment.

B. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior and interior).

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fasteners for labels and signs: Self tapping, blunt-ended stainless-steel screws, or stainless-steel machine screws with nuts and flat and lock washers. Sheet metal screws are not acceptable. Self-drilling screws are not allowed.

B. Install identification labels according to manufacturer's written instructions.

C. Install labels where indicated and as required by the Authority Having Jurisdiction and the Department of Labor and Industries. Locate for optimum viewing and without interference with the operation and maintenance of equipment.

D. Verify identity of each item before installing identification products.

E. Labeling abbreviations not permitted without F&I approval.

F. Temporary markings allowed only if removable without damage to equipment or enclosure finish.

G. System Identification Color-Coding Bands for Raceways: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

   1. Blue
   2. Yellow
   3. Black

H. Cable Ties: For attaching tags. Use general-purpose type, fungus inert, self- extinguishing, one piece, self-locking Type 6/6 nylon, except as listed below:

   1. Outdoors: UV-stabilized nylon.
   2. In spaces handling environmental air: Plenum rated.

I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

J. Coordinate names, abbreviations, colors, graphics and other designations used for electrical identification with corresponding designations used in the Contract

   1. Documents or as required by codes and standards. Use consistent designations throughout the Project. Labeling abbreviations are not allowed.

K. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish Work.

   1. Coordinate installing electrical identifying labels prior to installing acoustical ceilings and similar finishes that conceal such items.

L. Clean surfaces of dust, loose material, and oily films before applying painted or self-adhesive identification products.

M. Painted Identification Products:

1. Prime surfaces according to manufacturer's instructions prior to applying painted labels:
    a. For galvanized metal, use single-component, acrylic vehicle coating formulated for galvanized surfaces.
    b. For concrete masonry units, use heavy-duty, acrylic-resin block filler.
    c. For concrete surfaces, use clear, alkali-resistant, alkyd binder-type sealer.
2. Apply one intermediate and one finish coat of paint.

3.02 IDENTIFICATION SCHEDULE

A. Panelboard Schedules:
    1. Panelboard schedules shall utilize the Port of Tacoma standard panel schedule in Microsoft Excel format which has provision for totaling all loads and performing demand calculations by load category.

B. Medium Voltage Raceways: Provide 5/8 inch high stenciled or manufactured letters noting "HIGH VOLTAGE", black letters on yellow background on all exposed feeder conduits where entering or leaving switchboards and along conduit runs at 25 feet on center.

C. Accessible Raceways, More Than 600 V: Self-adhesive vinyl labels. Install labels at all conduit penetrations and along length of exposed conduit run at 25 foot maximum intervals.

D. Accessible Raceways within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage.
    1. Provide labels on all raceways, junction and pull boxes indicating panel designation and circuit number for all circuits in raceway or box, and conduit destination.
        a. Conduit Label Example: B2-P4-23G-1/1,3,5, B-2601-9.
        b. Provide labels at all locations where conduit penetrates walls, floors and ceilings, on both sides of penetration.
        c. Provide labels at all ends or breaks in conduit runs such as electrical rooms, junction boxes, pull boxes, cabinets, maintenance holes, fire penetrations, etc.
        d. Provide labels on each conduit entering junction or pull box within 12" of junction or pull box.
        e. Provide labels at 25 foot maximum intervals along conduit runs.
        f. Provide labels on all junction and pullboxes, including in accessible ceiling spaces and exposed in unfinished areas. Refer to specification sections for identification requirements for systems contained within.
        g. Install labels parallel to equipment lines.
        h. Labels in unfinished locations, including in accessible ceiling spaces and exposed unfinished areas shall be machine printed vinyl labels minimum ½ inch high, white with black letters. Labels in finished locations shall be adhesive-backed plastic machine printed labels, minimum 3/8 inch high, white with black letters.
        i. Lettering shall be a minimum of ¼" high.
        j. In finished locations, provide labels on inside of junction or pull box cover.

k. Provide red lettering when served by an emergency source.

E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for feeder and branch-circuit conductors.

a. Provide colored insulation when available, typically for wire sized #8 AWG and smaller.

b. Provide minimum 2 inch wide band of colored plastic tape at all terminations and splices (where allowed). 3M Scotch No. 35, Or Approved Equal Electrical Color Coding Tape.

c. Colors for 480/277V 3Ø, 4-wire systems:

1) Brown.

2) Orange

3) Yellow

4) Gray

5) Green

d. Colors for 208/120V, 3Ø, 4-wire systems:

1) Black

2) Red

3) Blue

4) White

5) Green

6) Green with yellow or orange stripe

e. Colors for 120/240V, 1Ø, 3-wire systems: (non-standard)

1) Black

2) Red

3) White

4) Green

f. For 240-delta systems (obsolete) the color of the high leg (approximately 200 volts to ground) shall be red. Label interior of all equipment “CAUTION: HIGH LEG IS OVER 120V TO GROUND. DO NOT USE FOR 120V CIRCUITS”.

g. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

2. Provide wire markers on each conductor in panelboards, gutters, pull boxes, outlet and junction boxes and at the load connection. Identify with branch circuit or feeder number for power and lighting circuits.

a. Install conductor labeling in panelboards and enclosures to ensure labels are visible.

F. Power-Circuit Conductor Identification, Medium Voltage: Provide labeling at all accessible locations including each termination or interconnection of wiring, and in vaults, pull and junction boxes, manholes, and handholes. Identify conductors with cloth type, split sleeve or tubing type wire and cable markers.

1. Label each cable with phase designation, operating voltage and circuit number.
2. Color Coding for Phase:
   a. 4160Y/2400V AC 3Ø, 4-wire:
      1) Black/Pink
      2) Red/Pink
      3) Blue/Pink
      4) White/Pink
   b. 4160V Delta AC, 3Ø, 4-wire
      1) Black/Brown
      2) Red/Brown
      3) Blue/Brown
   c. 12,470V Delta AC, 3Ø, 4-wire
      1) Black/Orange
      2) Red/Orange
      3) Blue/Orange
3. Provide write-on tags or nonmetallic plastic tag holder with adhesive- backed phase tags, and a separate tag with the circuit designation.

G. Install instructional sign including the color code for grounded and ungrounded conductors using adhesive-film-type labels.

H. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.

1. Provide wire markers on each conductor in wire gutters, pull boxes, outlet and junction boxes and at the equipment connection. Identify with control wire number as indicated on schematics and interconnection diagrams or equipment manufacturer’s shop drawings for control wiring.

I. Control-Circuit Conductor Termination Identification: For identification at terminations provide heat-shrink preprinted tubes with the conductor designation

J. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

K. Conductor Identification:

1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color coding for voltage and phase indication of secondary circuit.
3. Multiple Control and Communications Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color coding, or cable marking tape.

L. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Install underground-line warning tape for both direct-buried cables and cables in raceway.

M. Workspace Indication: Install floor marking tape or paint to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

N. Warning, Caution, and Instruction Signs:

1. Install warning, caution, and instruction signs where indicated or required to ensure safe operation and maintenance of electrical systems and of items to which they connect. Provide OSHA standard text where approved. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location. Mount permanently in an appropriate location. Comply with ANSI A13.1 standard color and design.
2. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
3. Emergency-Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

O. Apply equipment identification labels of engraved plastic laminate on each major unit of equipment, including central or master unit of each system. This includes communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Except as otherwise indicated, provide a single line of text with 1/4-inch high lettering on 1-inch high label. Use white lettering on black field. Apply labels parallel to equipment lines.

P. Outdoor Equipment: Engraved, laminated acrylic or melamine label, to comply with requirements listed above. Provide panel schedule printed on 8.5x11 paper in Port standard format in each panelboard. Insert folded schedule in schedule holder on inside of panel door. Posted panel schedule shall be updated to reflect all new work in panel. Include project completion date on schedule.

Q. Provide self-adhesive tape labels on all receptacle cover plates. Labels shall be machine printed with black lettering on white or clear background.

1. Indicate source panel name and circuit number.
2. Provide red lettering on white or clear background for devices on emergency circuits.
3. Where receptacle faceplate is dark color, provide white letters on clear background.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. The intent of Commissioning is to verify systems and equipment are being delivered to the Port of Tacoma fully functioning in accordance with project documents and for which the Port's personnel are fully trained and equipped to operate, maintain and troubleshoot. Additionally, the Port shall have supporting documentation to enable Port staff to maintain systems and equipment in accordance with manufacturer's recommendations and the Port's intent to sustain operations over the life of the system or equipment.

B. Commissioning services shall be provided by the contractor hired commissioning agent. Contractor shall perform related work as specified to assist Owner's personnel in the commissioning process.

C. Commissioning services for specialty equipment shall be provided by the manufacturer's factory authorized representative and shall coordinate with the contractor's hired commissioning agent. Contractor shall perform related work as specified to assist Owner's personnel in the commissioning process.

1.02 TERMS AND DEFINITIONS

A. Commissioning: The process certifying that mechanical, electrical, communications, control, and life safety systems equipment, subsystems or systems, function together properly to meet performance requirements and design intent as shown in a composite manner in the Contract Documents.

B. Commissioning Authority: The person or persons contracted by the Contractor to direct the commissioning process through appropriate contract channels and recommend project completion from the commissioning perspective.

C. Systems: Group of components and equipment functioning as a unit or performing a common function. (IE: Chilled Water System: consisting of piping, valves, fittings, controls, chillers, expansion tanks, air relief, chemical treatment, pumps, etc.)

D. Functional Testing: That full range of checks and tests carried out to determine if all components, sub-systems, systems, and interfaces between systems function in accordance with the contract documents. In this context, "function" includes all modes and sequences of control operation, all interlocks and conditional control responses, and all specified responses to abnormal emergency conditions.

E. Acceptable Performance: A component or system shall meet specified design parameters and criteria under actual load conditions for duration of time as indicated within the functional test criteria as determined by technical specifications and manufacturer's literature.

F. Areas of Conflict: Where 26 08 00 - Commissioning specifications or requirements conflict with Technical Specifications or other requirements, the Technical Specification requirements shall take precedence.

1.03 COMMISSIONING TEAM

A. The commissioning team shall consist of the Port's representatives, Contractor's Commissioning Agent, Contractor, and other Subcontractors, Manufacturers, and the Project Engineers in accordance with their contractual arrangements with the Port. The Port's operating staff will be included during specific elements of the commissioning process. It is the intent that all members work together as a team to fulfill their contractual responsibilities and meet the objectives of the Contract Documents and make the project turnover and commissioning process seamless.

1.04 CONTRACTOR

A. The Contractor shall execute the testing procedures in accordance with the commissioning plan.

B. A Contractor's representative shall be present during all commissioning activities performed by itself or one of its Subcontractors.

C. The Contractor will schedule and execute the commissioning plan to the satisfaction of the engineer.

1.05 DUTIES OF THE CONTRACTOR

A. Execute the commissioning plan through the operation of equipment and systems by their subcontractors.

B. Shall be solely responsible for the operations, testing, and results during the commissioning process for systems and equipment to perform in accordance with the contract documents.

C. Notify the Engineer in writing that equipment and systems are ready for commissioning.

D. Include within the master schedule, commissioning activities and durations.

E. Professionally maintain shop drawings, as-built drawings and system single-line schematics and diagrams for all systems that are installed and are to be included in the O&M manuals and used during the commissioning process and training per Section 01 70 00.

1.06 COMMISSIONING PHASING AND SEQUENCING

A. The Contractor shall coordinate all phasing and/or sequencing requirements to integrate the commissioning plan activities and durations within the master schedule.

1.07 ACCEPTANCE PROCEDURES

A. The Contractor shall execute the commissioning plan and verify that all commissioning activities have been completed and all activities have successfully met or exceeded the established acceptance criteria.

B. The Contractor shall provide all acceptance test results and documentation to the Engineer for review and acceptance.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 GENERAL

A. Contractor shall operate equipment and systems and conduct all tests in presence of the Engineer and/or a designated Port Representative(s) to demonstrate compliance with technical specifications.

1. Testing shall be conducted under design operating conditions as defined within the specifications and in the commissioning plan and approved by the Engineer.

B. All elements of systems shall be tested to demonstrate that total systems satisfy all requirements of the technical specifications. Testing shall be accomplished on hierarchical basis. Each piece of equipment will be tested for proper operation, followed by each subsystem, followed by entire system, followed by interfaces to other major systems.

C. Contractor or their subcontractor shall provide all special testing materials and test equipment.

3.02 PRE-COMMISSIONING WORK

A. Attend a commissioning scoping meeting and other meetings necessary to facilitate the commissioning process. One representative of the Contractor cognizant of respective aspects of their work shall attend commissioning meetings. Other trades shall attend the commissioning meetings when their portions of the work are being tested. The Owner's personnel will administer the meetings. Meeting location will be determined.

B. Normal start-up services required to bring system into a fully operational state. This includes cleaning, filling, purging, leak testing, motor rotation check, control sequences of operation, full and part load performance, and similar conditions.

C. Completion of controls installation, calibration, programming, and testing is critical for efficient and successful commissioning process.

3.03 PARTICIPATION IN COMMISSIONING

A. DESCRIPTION

1. Start up and test of systems shall be by skilled technicians. Make these same technicians available to assist the Owner's personnel in completing the commissioning process as it relates to each system and their technical specialty.

2. Coordinate work schedules, time required for commissioning, and similar conditions with the Owner's personnel. Ensure that qualified technicians are available and present during agreed upon schedules and for sufficient duration to complete necessary tests, adjustments, and problem resolutions.

B. System Issues and Discrepancies: Additional technician time and Owner's personnel time may be required to resolve issues and discrepancies. Make additional technician time available for subsequent commissioning periods until required system performance is obtained.

1. Complete corrective work to permit completion of commissioning process.

2. If deadlines pass without resolution of the problems, the Owner reserves right to obtain supplementary services and equipment to resolve problems. Costs incurred to solve problems in an expeditious manner will be the Contractor's responsibility.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical acceptance testing

1.02 RELATED SPECIFICATIONS

A. Low Voltage Electrical Power Conductors and Cables

B. Grounding & Bonding for Electrical Systems

C. 26 08 00 Commissioning of Electrical Systems

D. Switchboards

E. 26 32 13 Engine Generators

F. 26 36 00 Transfer Switches

1.03 CONTRACTOR INSPECTION AND TESTING

A. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of Low Voltage Power Cables upon completion of installation.

B. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of the Electrical Ground Systems upon completion of installation.

C. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of Switchboards upon completion of installation.

D. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of Engine Generators upon completion of installation.

E. Contractor shall include in the base price of the contract costs associated to retain and engage the services of a recognized independent testing firm for the purpose of performing inspections and tests of Transfer Switches upon completion of installation.

F. Tests are to ensure that electrical equipment is operational and within industry and manufacturer’s tolerances, is installed in accordance with specifications, and to determine suitability for energization.

1.04 REFERENCED STANDARDS

A. American National Standards Institute (ANSI)

ANSI C2	National Electrical Safety Code
ANSI Z244-1	American National Standard for Personnel Protection

B. National Fire Protection Association (NFPA)

NFPA 70	National Electrical Code
NFPA 70B	Electrical Equipment Maintenance
NFPA 70E	Electrical Safety Requirements for Employee Workplaces
NFPA 78	Lightning Protection Code

NFPA 101 Life Safety Code

C. Occupational Safety and Health Administration: OSHA -

OSHA Part 1910 Subpart S, 1910.308

OSHA Part 1926 Subpart V, 1926.950 through 1926.960

D. State and local codes and ordinances

1.05 SUBMITTALS

A. Test reports:

1. Summary of Project, description of equipment tested, description of test, test results, conclusions and recommendations, appendix, including appropriate test forms, identification of test equipment used, and signature of responsible test organization authority. The Contractor shall submit five (5) copies of the complete report to the Owner/Engineer no later than 30 days after completion of project, unless directed otherwise.

B. Certification of testing firm qualifications.

C. Calibration program for test instrumentation indicating maintenance of rated accuracy.

D. A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted, and tested in accordance with the manufacturer's recommendations.

E. The Contractor shall provide three (3) copies of the manufacturer's representative's certification before final payment is made.

1.06 QUALITY ASSURANCE

A. The chosen testing agency shall exhibit and/or provide documentation for the following qualifications:

1. A field service organization which can function as an unbiased testing authority professionally independent of the manufacturers, suppliers and installers of equipment or systems evaluated by the testing firm.

2. Regularly engaged in the testing of electrical equipment devices, installations and systems for a minimum of 5 years.

3. Meet Federal OSHA criteria for accreditation of testing laboratories, Title 29, Parts 1907, 1910 and 1936.

4. Provide lead test engineer on site currently certified by the international Electrical Testing Association (NETA) or have at least 5 years experience in electrical power distribution system testing.

5. The firm shall utilize only full-time technicians who are regularly employed by the firm for testing services. Electrically unskilled employees shall not be permitted to perform testing or assistance. Electricians and linemen may assist, but may not perform testing and inspection services.

6. The Contractor shall submit proof of the above qualifications with bid documents when requested.

1.07 CONTRACTOR RESPONSIBILITY

A. Perform conductor insulation resistance, and continuity tests for distribution and utilization equipment before, and in addition to, tests performed by the testing firm.

B. Supply source of electrical power to each test site as specified by testing firm.

C. Notify the testing firm when equipment becomes available for acceptance tests. Coordinate to expedite project scheduling.

D. Correct any and all defects identified by the testing firm.

1.08 TESTING FIRM RESPONSIBILITY

A. Notify the engineer before commencement of testing.

B. Report systems, materials or workmanship that is found defective on the basis of acceptance tests.

C. Maintain written record of tests and upon completion of project, assemble and certify a final test report.

1.09 LIMITATION OF AUTHORITY OF TESTING FIRM

A. Testing firm is not authorized to:

1. Release, revoke, alter, or enlarge on requirements of contract documents.
2. Approve or accept any portion of the work.
3. Perform duties of contractor.
4. Stop the work.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

A. Calibration

1. Testing firm to have a calibration program that ensures that applicable test instrumentation are maintained within rated accuracy.
2. Accuracy to be directly traceable to the National Institute of Standards and Technology (NIST).
3. Calibrate instruments in accordance with the following frequency schedule:
   a. Field instruments: Analog - 6 months maximum
      Digital - 12 mos. maximum
   b. Laboratory instruments: 12 months
   c. Leased specialty equipment: 12 months, (where accuracy is guaranteed by lessor)
4. Provide visible, dated calibration labels on test equipment.
5. Keep records up-to-date showing date and results of instruments calibrated or tested.
6. Maintain up-to-date instrument calibration instruction and procedure for each test instrument.

7. Calibrate using standard of higher accuracy than that of the instrument tested.

B. Tests

1. In addition to standard NETA testing, provide as a minimum, the following tests for each system component as applicable. Document test results and submit for final acceptance.
   a. Operational test of each Panelboards, EVSEs, ground system and low voltage cables
   b. Cable Insulation test
   c. Bus insulation resistance test phase-to-phase and phase-to-ground.
   d. Bolt torques for bus connections.
   e. Inspect for damage and code violations.
   f. Inspect and measure resistance of ground connections.
   g. Verify correct sizing of all equipment

PART 3 - EXECUTION

3.01 SAFETY AND PRECAUTIONS

A. Use safety practices conforming to the following requirements:

1. Occupational Safety and Health Act of 1970 - OSHA
2. Accident Prevention Manual for Industrial Operations, National Safety Council, Chapter 4.
3. Applicable state and local safety operating procedures.
4. Owner's safety practices.
5. National Fire Protection Association - NFPA 70E.
6. ANSI Z244.1, American National Standards for Personnel Protection

B. Perform tests with apparatus de-energized except where otherwise specifically required and stated in equipment sections.

C. The testing firm will provide designated safety representative on the project or supervise operations with respect to safety.

D. Utilize the following references for inspections and tests:

1. Project design specifications
2. Project design drawings
3. Manufacturer's instruction manuals applicable to each particular apparatus.

3.02 FIELD QUALITY CONTROL

A. Max. Voltage Rating of Equipment (Volts DC): 600

Minimum Test Voltage (Volts DC): 1000

Reccomended MInimum Insulation Resistance (Meg-ohms): 100

B. Insulation resistance correction factors for conversion of test temperature to 20□C:

Temperature		Multiplier
□C	□F	

0	32	.40
5	41	.45
10	50	.50
15	59	.75
20	68	1.00
25	77	1.30
30	86	1.60
35	95	2.05
40	104	2.50
45	113	3.25
50	122	4.00
55	131	5.20
60	140	6.40
65	149	8.70
70	158	10.00
75	167	13.00
80	176	16.00

C. Bolt torques for bus connections:

1. Heat treated steel - Cadmium or zinc plated

Grade	SAE 1&2	SAE 5	SAE 6	SAE 8
Minimum Tensil (psi)	64k	105k	133k	150k
Bolt Diameter	Torque (Foot Pounds)			
1/4	4.0	5.6	8.0	8.4
5/16	7.2	11.2	15.2	17.6
3/8	12.0	20.0	27.2	29.6
7/16	19.2	32.0	44.0	48.0
1/2	29.6	48.0	68.0	73.6
9/16	42.4	70.4	96.0	105.6
5/8	59.2	96.0	133.6	144.0
3/4	96.0	160.0	224.0	236.8
7/8	152.0	241.6	352.0	378.4
1	225.6	372.8	528.0	571.2

2. Silicon bronze fasteners*:

Torque (Foot Pounds)		
Diameter	Non Lubricated	Lubricated
5/16	15	10
3/8	20	14
½	40	25
5/8	55	40
3/4	70	60

* Bronze alloy bolts to have a minimum tensile strength of 70,000 pounds per square inch.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. Scope of work

1. Install electrical service entrance equipment provided by others.
2. Service entrance equipment includes metering/pull and main circuit breaker and automatic transfer switch sections.

B. Related Sections

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 53 - Identification for Electrical Systems.
3. Section 26 36 00 – Transfer Switches

1.02 REFERENCES

A. American National Standards Institute

1. ANSI C12.1 - Code for Electricity Metering.
2. ANSI C39.1 - Requirements, Electrical Analog Indicating Instruments.

B. Institute of Electrical and Electronics Engineers

1. IEEE C57.13 - Standard Requirements for Instrument Transformers.
2. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

C. National Electrical Manufacturers Association

1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
2. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
3. NEMA PB 2 - Deadfront Distribution Switchboards.
4. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less.

D. International Electrical Testing Association

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.03 SUBMITTALS

1.04 SECTION 01 33 00 - SUBMITTAL PROCEDURES

A. Shop Drawings: Obtain shop drawing for equipment provided by other. Indicate front and side views of enclosures with overall dimensions shown; conduit entrance locations and requirements; nameplate legends; size and number of bus bars for each phase, neutral, and ground; and switchboard instrument details.

B. Product Data: Obtain product data for equipment provided by other. Submit electrical characteristics including voltage, frame size and trip ratings, fault current withstand ratings, and time-current curves of equipment and components.

C. Test Reports: Indicate results of factory production and field tests.

1.05 CLOSEOUT SUBMITTALS

A. Section 01 77 00 - Closeout Procedures

B. Project Record Documents: Record actual locations, configurations, and ratings of switchboards and their components on single line diagrams and plan layouts.

C. Operation and Maintenance Data: Obtain operation and maintenance manuals for equipment provided by others. Submit spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.06 QUALIFICATIONS

A. Manufacturer: EATON

1.07 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements

B. Accept switchboards on site. Inspect for damage.

C. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, water, construction debris, and traffic.

D. Handle in accordance with NEMA PB 2.1. Lift only with lugs provided. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements

B. Conform to NEMA PB 2 service conditions during and after installation of switchboards.

1.09 FIELD MEASUREMENTS

A. Verify field measurements prior to installation.

1.10 SEQUENCING

A. Section 01 14 00 – Work Restrictions.

B. Sequence Work to avoid interferences with building finishes and installation of other products.

1.11 MAINTENANCE MATERIALS

A. Section 01 77 00 - Closeout Procedures: Spare parts and maintenance products.

PART 2 - PRODUCTS

2.01 DISTRIBUTION SWITCHBOARDS

A. Provided By Others

B. Manufacturers:

1. EATON

C. Product Description: NEMA PB 2, enclosed switchboard with electrical ratings and configurations as indicated on Drawings.

1. Rating: 480 Volt , 800 Amp 3 phase , 4 wire

2. Enclosure: Outdoor Rated NEMA 3R stainless steel

3. Interrupting Rating: 65,000 aic.

2.02 MOLDED CASE CIRCUIT BREAKER

A. Manufacturers:

1. EATON

B. Product Description: NEMA AB 1, molded-case circuit breaker.

2.03 POWER METERS

A. Tacoma Power Utility Required Metering

PART 3 - EXECUTION

3.01 EXAMINATION

A. Section 01 71 00 – Examination and Preparation: Coordination and project conditions.

B. Verify surface is suitable for switchboard installation.

3.02 EXISTING WORK

A. Disconnect and remove abandoned switchboards components as shown in the drawings.

B. Maintain access to existing switchboards and other installations remaining active.

C. Clean and repair existing switchboards to remain or to be reinstalled.

3.03 INSTALLATION

A. Install in accordance with NEMA PB 2.1.

B. Tighten accessible bus connections and mechanical fasteners after placing switchboard.

C. Install and coordinate sizes with connected load.

D. Install engraved plastic nameplates in accordance with Section 26 05 53.

E. Install breaker circuit directory.

F. Ground and bond switchboards in accordance with Section 26 05 26.

3.04 FIELD QUALITY CONTROL

A. Section 01 45 00 - Quality Control, 01 77 00 - Closeout Procedures:

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.1.

3.05 ADJUSTING

A. Section 01 77 00 - Closeout Procedures: Testing, adjusting, and balancing.

B. Adjust operating mechanisms for free mechanical movement.

C. Tighten bolted bus connections.

D. Adjust circuit breaker trip and time delay settings to values as per the coordination study results.

3.06 CLEANING

3.07 SECTION 01 77 00 - CLOSEOUT PROCEDURES

A. Touch up scratched or marred surfaces to match original finish.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of “Cabinets and Enclosures” Work is shown in the Contract Documents. This section includes hinged cover enclosures, cabinets, terminal blocks, and accessories.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. NECA (National Electrical Contractors Association) - National Electrical Installation Standards

B. NEMA 250 (National Electrical Manufacturers Association) - Enclosures for Electrical Equipment (1000 Volts Maximum)

C. NEMA ICS 4 (National Electrical Manufacturers Association) – Application Guideline for Terminal Blocks.

D. NFPA 70 (National Fire Protection Association) - National Electrical Code

1.03 SUBMITTALS

A. Submit materials data in accordance with Section 01 33 00 – Submittals Procedures. Furnish manufacturers’ technical literature, standard details, product specifications, and installation instructions for all products.

B. Submittals shall include the following:

1. Product Data: For enclosures, cabinets, and terminal blocks.

2. Manufacturer’s Installation Instructions, including storage, handling, protection, examination, preparation, and installation of product.

3. Shop Drawings: Include layout drawings showing components and wiring for nonstandard enclosures, and cabinets.

1.04 QUALITY ASSURANCE

A. Listing and Labeling: Provide products that are Listed and Labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction, and marked for intended use for the location and environment in which they are installed.

B. Comply with NECA’s “National Electrical Installation Standards.”

C. Comply with NFPA 70, as adopted and administered by the Authority Having Jurisdiction.

1.05 EXTRA MATERIALS

A. Spare and extra parts shall be identified for all products, but not provided. Include spare parts information in Operation and Maintenance Manual

PART 2 - PRODUCTS

2.01 HINGED COVER ENCLOSURES

A. Construction: NEMA 250, Type 12, except as noted below, with continuous hinge cover and flush latch. Key latch to match panelboards.

1. Metal Enclosures: Painted Galvanized Steel

2. Nonmetallic Enclosures: PVC or fiberglass, finished inside with radio- frequency-resistant paint.

3. Application in other than NEMA 250, Type 12 environments:
    a. Outdoor, Damp or Wet Locations: NEMA 4X Stainless Steel
    b. Outdoor dirty/oily and washdown locations such as Aircraft Operations Areas: NEMA 4, stainless steel.
    c. Damp or Wet and Corrosive Locations: NEMA 250, Type 4X, stainless steel.

2.02 CABINETS

A. Cabinets: NEMA 250, Type 12, except as noted below, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
    1. 316 SS Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards.
    2. Include metal barriers to separate wiring of different systems and voltage.
    3. Include accessory feet where required for freestanding equipment.
    4. Application in other than NEMA 250, Type 12 environments:
        a. Outdoor, Damp or Wet Locations: NEMA 4X, stainless steel
        b. Outdoor dirty/oily and washdown locations such as Aircraft Operations Areas: NEMA 4X, stainless steel.
        c. Damp or Wet and Corrosive Locations: NEMA 250, Type 4X, stainless steel.

2.03 TERMINAL BLOCKS

A. Minimum 600-volt rating for 480-volt circuits.
B. Clamp or screw terminals sized for maximum conductor size.
C. Separate connection point for each conductor.
D. Ten percent spare terminal points.
E. Individual identification for each terminal block.
F. Phenolic block separators or barriers to isolate low-voltage and control terminations from analog and DC circuits.
G. Terminal Blocks: NEMA ICS 4.
H. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
I. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.
J. Provide ground bus terminal block, with each connector bonded to enclosure.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive enclosures, and cabinets for compliance with installation tolerances, access and working clearances. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 EXISTING WORK

A. Remove abandoned cabinets and enclosures. Patch surfaces.

B. Maintain access to existing cabinets and enclosures and other installations which remain active and which require access. Modify installation to provide access as appropriate.

C. Extend existing cabinets and enclosures using materials and methods as specified.

D. Clean and repair existing cabinets and enclosures which remain or are to be reinstalled.

3.03 INSTALLATION

A. Install enclosures and cabinets as indicated, according to manufacturer's written instructions and in accordance with NECA "National Electrical Installation Standards."

B. Install enclosures and cabinets plumb and level. Anchor securely.

3.04 IDENTIFICATION

A. Provide labels for enclosures and components as specified in Section 26 05 53 - Electrical Identification.

B. Control Panels: Include panel designation, power source location, panel designation and circuit number.

C. Equipment used in emergency systems shall be labeled "Suitable for use on emergency systems" per NEC 700-3.

D. Instructional signs: Install approved legend where instructions or explanations are required for system or equipment operation.

3.05 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.

1. Repair damage to finishes recommended by manufacturer.

3.06 CLEANING

A. On completion of installation, clean electrical parts and remove conductive and harmful materials

B. Remove dirt and debris from enclosure.

C. Clean finishes and touch up damage.

END OF SECTION

This page intentionally left blank

PART 1 GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of Engine “Generator” Work is shown in the Contract Documents.

B. Install engine generator set, exhaust silencer and fittings, base mounted fuel tank and fittings, battery and charger provided by others.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. NEMA 250 (National Electrical Manufacturers Association) - Enclosures for Electrical Equipment (1000 Volts Maximum.)

B. NEMA AB 1 (National Electrical Manufacturers Association) - Molded Case Circuit Breakers

C. NEMA ICS 10 (National Electrical Manufacturers Association) - Industrial Control and Systems: AC Transfer Switch Equipment

D. NEMA MG 1 (National Electrical Manufacturers Association) - Motors and Generators

E. NETA ATS (International Electrical Testing Association)- Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems

F. NFPA 30 (National Fire Protection Association) - Flammable and Combustible Liquids Code

G. NFPA 70 – National Electrical Code

H. NFPA 110 (National Fire Protection Association) - Emergency and Standby Power Systems

1.03 DELIVERY, STORAGE, AND HANDLING

A. Receive generator and component at Port of Tacoma Maintenance Building, Tacoma Washington.

B. Store engine generator and ancillaries indoors in clean, dry space with uniform temperature to prevent condensation. Protect from exposure to dirt, fumes, water, corrosive substances, and physical damage.

C. If stored in areas subject to weather, cover engine generator and ancillaries to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers; install electric heating of sufficient wattage to prevent condensation.

D. Handle in accordance with manufacturer’s written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to engine generator internal components, enclosure, and finish. Coordinate directly with manufacturer for special handling needs in restricted access locations.

1.04 COORDINATION

A. Coordinate layout and installation of engine generators and ancillaries with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate size and location of concrete bases with actual equipment supplied. Cast anchorage devices into bases in accordance with drawings and manufactures recommendations.

PART 2 - PRODUCTS

2.01 ENGINE GENERATOR SET

A. Manufacturers:
   1. Cummins Onan.

B. ASME Compliance: Comply with ASME B15.1.

C. NFPA Compliance:
   1. Comply with NFPA 37.
   2. Comply with NFPA 70.

D. UL Compliance: Comply with UL 2200.

E. Engine Exhaust Emissions: Comply with EPA Tier 2 requirements and applicable state and local government requirements.

F. General: The engine generator set shall be comprised of a diesel prime mover and a generator mounted to a structural steel base with lifting and pulling eyes, furnished complete with ancillaries and ready to run.

G. Ratings:
   1. Voltage: 480Y/277 VAC, 3-phase, 4-wire.
   2. Standby Power Rating : 500kW
   3. Power Factor: As shown on plans.
   4. Speed: 1800 rpm

H. Service Conditions
   1. Ambient Temperature: 0°°C to 40°C
   2. Altitude: 10 feet above sea level
   3. Seismic: Zone 3.

I. Performance:
   1. Steady-State Voltage Operational Bandwidth: 4 percent of rated output voltage from no load to full load.
   2. Steady-State Voltage Modulation Frequency: Less than 1 Hz.
   3. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage recovery to remain within the steady-state operating band within three seconds.
   4. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
   5. Steady-State Frequency Stability: When system is operating at any constant load within rated load, there are no random speed variations outside the steady-state operational band and no hunting or surging of speed.

6. Transient Frequency Performance: Less than 5 percent variation for a 50 percent step-load increase or decrease. Frequency recovers to remain within the steady-state operating band within five seconds.
7. Output Waveform: At no load, harmonic content measured line to line or line to neutral does not exceed 5 percent total and 3 percent for single harmonics. The telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.
8. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, the system will supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to any generator system component.
9. Start Time: Comply with NFPA 110, Type 10, system requirements to start, come up to speed and voltage, and to connect to load within10 seconds.

2.02 ENGINE

A. Diesel, 1800 RPM

B. Description:

1. Rated for prime power duty per applicable standards.
2. Water-cooled, inline or V-type, cast iron.
3. Four-stroke cycle.
4. Pressure lubricated with filter and cooler.
5. Integral injection pumps.
6. Compression ignition (Diesel) internal combustion.

C. Piston Speed: 2250 feet per minute maximum.

D. Fuel: No.2 fuel oil.

E. Engine Fuel System:

1. Main fuel pump: engine driven, adequate for starting and load conditions.
2. Pressure regulating valve: Maintains design pressure in fuel rail and returns excess to tank.

F. Lubrication System:

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

G. Cooling System:

1. Closed loop, liquid cooled.
2. Integral engine-driven coolant pump.
3. Self-contained, thermostatic temperature control valve.

4. Engine Jacket Heater, sized to maintain 32°C.

H. Radiator: Non-ferrous metal, no aluminum. Sized to maintain safe engine temperature in ambient of 43°C.

1. Integral radiator:

a. Factory mounted on engine generator base.

b. Integral belt-driven engine fan.

I. Exhaust System:

1. Critical type muffler/silencer.

2. Sound level at 25-foot distance: 56 dBA or less.

3. Stainless steel flex and expansion connections.

J. Combustion Air Intake System:

1. Filter factory-mounted on generator in an accessible location.

K. Mounting and Base:

1. Spring-type vibration isolators.

2. Structural steel skid-type base with rigging diagram.

3. Lifting lugs, pulling eyes and jacking pads.

4. Designed to withstand seismic zone 3 event.

L. Starting System:

1. Batteries shall be gel cell, no maintenance type.

2. Racks shall be FRP, seismic Zone 3.

3. 24VDC, negative ground battery,

4. 3 cranking cycles (75 seconds) per NFPA 110

5. Engine-driven alternator, 35 amp minimum.

6. Equalizing battery charger, 10 amp minimum. Charger shall be matched to battery systems.

7. Heated battery compartment, maintained temperature above 10ºC at all time.

2.03 GENERATOR

A. Instrument transformers and anti-condensation heater mounted within generator enclosure.

B. Description:

1. NEMA MG1.

2. Synchronous.

3. Three phase, four pole.

C. Insulation Class:

1. 480 VAC Generator: Class H.

D. Temperature Rise: 125° C standby at 40°C ambient at prime power rating.

E. Construction:

1. Single bearing rotor direct coupled to engine by flexible disc.
2. Amortisseur winding, integral fan.
3. 2/3 pitch stator windings.

F. Design Conditions:

1. 125% overspeed.
2. 110% overload.

G. Exciter/voltage regulator:

1. Rotating brushless exciter.
2. Permanent magnet generator excitation power source.
3. Solid state regulator with 3-phase sensing and volts-per-hertz compensation.
4. Capable of supplying 300% rated current into a fault for 10 seconds.
5. Voltage regulation of plus or minus 1% from no load to full load.
6. Adjustable voltage droop, voltage level and voltage gain.

2.04 GOVERNOR

A. Description:

1. Electronic governor, adjustable 0% (isochronous) to 10% speed droop.
2. Provision for parallel generator operation.

B. Performance:

1. Maintain engine speed within 0.5 percent, steady state.
2. Recover to steady state within 2 seconds following sudden load changes.

2.05 DAY TANK

A. Description:

1. Integral rupture basin with leak detector.
2. Dual integral pumps and level control.
3. Fuel gage, level alarms.

B. Performance:

1. Sized for 8 -hour full-load operation.

2.06 GENERATOR PROTECTION

A. Generator rating 0-500 kVA (480 VAC): Molded-case, thermal-magnetic, 100% rated generator breaker with shunt trip, mounted on generator.

B. Generator rating over 500 kVA (480 VAC): Insulated-case, adjustable electronic trip, 100% rated generator breaker with shunt trip, mounted on generator or in generator switchgear.

2.07 ENGINE GENERATOR CONTROL MODULE

A. Description:
   1. Microprocessor based.
   2. Communications interface for remote control and monitoring including metering.
   3. Interactive control panel for unit control, diagnostics and data inquiry.
   4. Environmentally hardened enclosure.

B. Controls and displays:
   1. “RUN/OFF/AUTO” switch (key operated).
   2. “EMERGENCY STOP” pushbutton.
   3. Generator Volts.
   4. Generator Amps.
   5. Generator Kilowatts.
   6. Generator Frequency.
   7. Generator kVARs.
   8. Generator Power Factor.
   9. Engine Oil Pressure, Temperature, RPM, Running Hours and DC (battery) voltage.
   10. Fuel Level.

C. Standard alarms:
   1. High Stator Temperature (for 4160 VAC generators with stator RTD's)
   2. Low Oil Pressure.
   3. High Coolant Temperature.
   4. Low Fuel Level - Daytank.

D. Standard shutdowns:
   1. Low-Low Oil Pressure.
   2. High-High Coolant Temperature.
   3. Overcrank.
   4. Overspeed.
   5. Emergency Shutdown.

2.08 GENERATOR ENCLOSURE

A. Pre-assembled, pre-integrated factory supplied sound-attenuated weather-protective enclosure.

B. Mounted directly to integrated sub-base fuel day tank.

C. UL2200- listed.

2.09 SOURCE QUALITY CONTROL

A. Factory tests:

1. 45 minute run at 1/4, 2/4, 3/4 and full load.
2. Transient and steady-state governing.
3. Single-step load pickup.
4. Functional test of safety and protective shutdowns.

B. Observation: Provide at least fourteen days advance notice of inspections and tests to allow observation by the Port.

C. Report test results within ten days of completion of tests.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas, equipment foundations, and conditions, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.

1. Verify that adequate space is available at the proposed unit location for the generator set plus clearances required by the NEC and the manufacturer. Provide sufficient access to the unit location to allow removal and replacement of a complete unit.
2. Verify that the location and arrangements for re-fueling the generator are easily accessible by a tanker truck under outage conditions, including the potential disruption of a seismic event.
3. Verify that all piping systems for fuel, coolant and exhaust as well as electrical conduit runs are located and installed to the same seismic standard as the generator.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Examine roughing-in of cooling-system piping systems, exhaust piping systems and electrical connections. Verify actual locations of connections before packaged engine generator installation.

3.02 SERVICE INTERRUPTION

A. Provide Owner and Engineer one week notice of all interruption to existing electrical service. Obtain Engineer’s written permission prior to interruption of existing electrical service.

3.03 CONCRETE BASES

A. Install concrete bases of dimensions indicated for packaged engine generators. Refer to Section 03 30 00 - Cast-in-Place Concrete

3.04 INSTALLATION

A. Comply with engine generator manufacturers’ written installation and alignment instructions, and with NFPA 110.

B. Set packaged engine generator set on concrete bases.

1. Support generator-set mounting feet on rectangular metal blocks and shims or on metal wedges having small taper, at points near foundation bolts to provide 3/4- to 1-1/2-inch gap between pump base and foundation for grouting.
2. Adjust metal supports or wedges until generator is level.

C. Install packaged engine generator to provide access for periodic maintenance, including removal of drivers and accessories.

D. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

1. Verify that electrical wiring is installed according to manufacturers' submittal and installation requirements in Division 26 Electrical Sections. Proceed with equipment startup only after wiring installation is satisfactory.

E. Install control panel, transfer switch, battery rack, battery charger, exhaust silencer, day tank, and remote radiator in accordance with manufacturer's instructions, drawings. Verify batteries are securely mounted to battery rack.

F. Provide grounding and bonding for separately derived system in accordance with the drawings, Article 250 of the National Electrical Code.

3.05 CONNECTIONS

A. Electrical wiring and connections are specified in Division 26 Electrical Sections.

B. Ground equipment.

C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

1. Mark lugs after torquing with red paint such that paint will be visibly disturbed if lugs are disturbed.

3.06 IDENTIFICATION

A. Identify system components according to Section 26 05 53 - Electrical Identification.

B. Label generator with equipment designation, kW rating and voltage.

C. Label ancillary equipment with equipment designation, power source and circuit numbers, and power source location.

D. Label voltage rating of batteries on battery rack.

E. Apply instrument labels on all field-mounted instruments, transmitters, pressure gauges and control valves.

F. Instructional signs: Install approved legend where instructions or explanations are required for system or equipment operation.

3.07 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Coordinate with a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections, and to assist in testing. Report results in writing.

1. Testing: Engage a qualified independent testing agency to perform field quality-control testing.

a. Electrical Contractor shall accompany the independent testing firm field service technician and assist as required during field tests.

B. Tests: Include the following:

1. Factory Tests:

a. The generator unit shall pass the 45-minutes run test at ach load level of ¼, ½, ¾, and full loading.

b. Operational test of safety and protective shutdown systems of each protective device.

2. Onsite field tests recommended by manufacturer.

3. InterNational Electrical Testing Association Tests: Perform each visual and mechanical inspection and electrical and mechanical test stated in NETA ATS for engine generator sets, except omit vibration baseline test. Certify compliance with test parameters for tests performed.

4. Perform tests required:

a. Full load test shall be 8-hour continuous duration. Record key data every 15 minutes during the test.

b. Perform a single-step full-load pickup test. Record transient parameters during the test.

c. Perform a thorough test and checkout of the battery and battery charging system.

d. Arrangements for simulating primary power loss shall be coordinated with the Port.

5. Battery Tests: Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery. Verify acceptance of charge for each element of battery after discharge. Verify measurements are within manufacturer's specifications.

6. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

7. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.

8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.

9. Harmonic-Content Tests: Measure harmonic content of output voltage at under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.

C. Coordinate tests with tests for transfer switches where applicable and run them concurrently.

D. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

E. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

F. Test instruments shall have been calibrated within the last 12 months, traceable to standards of the National Institute for Standards and Technology, and adequate for making positive observation of test results. Make calibration records available for examination on request.

3.08 COMMISIONING

A. Battery Equalization: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

B. Adjust generator output voltage and engine speed to meet specified ratings.

C. Clean engine and generator surfaces. Replace oil and fuel filters.

3.09 DEMONSTRATION AND TRAINING

A. Engage a factory-authorized service representative to train Port's maintenance personnel to adjust, operate, and maintain packaged engine generators as specified below:

1. Train Port's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.

2. Minimum Scheduled Instruction Period: Eight hours.

3.10 OPERATION AND MAINTENANCE MANUALS

A. Comply with Section 01 78 23 - Operations and Maintenance Manuals and Part 1 of this specification.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of “Transfer Switches” Work is shown in the Contract Documents.

B. Install Automatic transfer switch furnished by others.

1.02 GOVERNING CODES, STANDARDS AND REFERENCES

A. ANSI/NEMA ICS 10 (National Electrical Manufacturers Association) - AC Transfer Switch Equipment.

B. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. ANSI/UL 1008 - Automatic Transfer Switches.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Automatic transfer switch will ship FOB to Port of Tacoma Maintenance Building, Tacoma Washington.

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 in accordance with manufacturer’s written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to internal components, enclosure, and finish.

1.04 COORDINATION

A. Coordinate layout and installation of transfer switches with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access panels.

B. Coordinate size and location of concrete bases with actual equipment supplied. Cast anchor-bolt inserts into bases, in accordance with drawings. Refer to Division 3 Concrete for concrete, reinforcement, and formwork requirements.

PART 2 - PRODUCTS

2.01 TRANSFER SWITCH - GENERAL

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cutler-Hammer; Division of Eaton.

B. Compliance: Comply with NEMA ICS 10 and UL 1008.

C. Ratings:

1. EUSERC Electrical Service Rated.
2. Voltage: 480Y/277 Volts AC, 60 hertz, 3-phase, 4-wire.
3. Continuous current: 800 Amps.
4. Neutral Current: 100% of nominal switch rating.
5. Operating Temperature: Continuous current rating shall apply at 40□ C ambient.
6. Minimum Withstand Rating: 50k AIC.

7. Poles: 4-pole with break-before-make neutral switching

D. Seismic Rating: Seismic zone 3.

E. Type: Automatic

F. Enclosure:

Outdoor: NEMA 3R stainless steel

2.02 AUTOMATIC TRANSFER SWITCH

A. Description:

1. Monitor all three phases of both normal and alternate sources and initiate appropriate transfer as governed by the switch control settings.
2. Electrically operated, mechanically held with a constant contact pressure independent of voltage variations.
3. Inherently double-throw type, incapable of intermediate position stops between poles.

B. Field adjustable controls:

1. Differential voltage sensing on the normal source.
2. Voltage sensing of alternate source.
3. Frequency sensing of alternate source.
4. Time delay to override normal source voltage dips before initiating start.
5. Re-transfer to normal time delay.
6. Unloaded run time delay.

C. Control devices:

1. Test switch.
2. Switch position indicating lights.
3. Source available indicating lights.
4. Engine start and shutdown contacts.
5. Auxiliary contacts.
6. The transfer switch shall be equipped with optional accessories as required for the specific application.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive transfer switches for compliance with installation tolerances, ventilation requirements and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify mounting supports are properly sized and located.

3.02 INSTALLATION

A. Install transfer switch on 316 SS equipment rack with concrete base complying with Section 03 30 00 - Cast-in-Place Concrete.

B. Comply with manufacturer's recommendations, drawings and mounting and anchoring requirements specified for Electrical and Communication Work.

C. Ground equipment.

D. Tighten electrical connectors and terminals according to manufacturer’s published torque-tightening values.

1. If manufacturer’s torque values are not indicated, use those specified in UL 486A and UL 486B.

2. Mark lugs after torquing with red paint such that paint will be visibly disturbed if lugs are disturbed.

3.03 IDENTIFICATION

A. Identify transfer switch, transfer switch components, and control wiring according to Section 26 05 53 - Electrical Identification.

B. Identify transfer switch name, designation, power sources, source locations, voltage, load served and load location.

C. Operating Instructions: Frame printed operating instructions for transfer switch, including control sequences and back-up procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of transfer switch.

3.04 ADJUSTING

A. Adjust control and sensing devices to achieve specified sequence of operation.

3.05 FIELD QUALITY CONTROL

A. Comply with Section 01 45 00 - Quality Control.

B. Testing: Perform the following field quality-control testing:

1. Perform inspections and tests listed in NETA ATS, Section 7.22.3.

2. Certify compliance with test parameters.

3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Manufacturer’s Field Service: Engage a factory-authorized service representative to inspect equipment installation and operation.

D. Test Reports: Prepare a written report to record the following:

1. Test procedures used.

2. Test results that comply with requirements.

3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

3.06 CLEANING

A. Clean transfer switch internally, on completion of installation, according to manufacturer's written instructions. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

3.07 DEMONSTRATION AND TRAINING

A. Demonstrate operation of transfer switch in bypass, normal, and emergency modes.

B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switch.

1. Train Port's maintenance personnel for a minimum of four hours on procedures and schedules for operating, troubleshooting, servicing, and maintaining equipment and schedules.

2. Review data in maintenance manuals. Refer to Section 01 78 23 - Operations and Maintenance Manuals.

3. Schedule training with the Port with at least seven days' advance notice.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Excavation of existing materials.
2. Grading, excavating and preparation of grade for walks, pavements and other items.
3. Compaction.
4. Disposal of excess or unsuitable material.
5. Importation and placement of various fill materials
6. Cutting, grading and rough contouring
7. Backfilling building perimeter to subgrade elevations.
8. Backfilling site structures to subgrade elevations.
9. Fill under slabs-on-grade.
10. Fill under paving.
11. Fill for over-excavation.
12. Survey staking for layout and elevations and record documents.

B. Related Sections:

1. Section 03 30 00 – Cast-in-Place Concrete
2. Section 31 10 00 - Site Clearing.
3. Section 31 23 33 - Trenching and Backfilling.
4. Section 32 12 16.01 - Asphalt Pavement.

1.02 REFERENCES

A. Washington State Department of Transportation 2022 Standard Specifications for Road, Bridge and Municipal Construction:

1. WSDOT 2-09 – Structure Excavation
2. WSDOT 9-33.2 - Geosynthetic Properties.

B. Washington Administrative Code:

1. WAC 296-155 - Safety Standards for Construction Work.

C. ASTM International:

1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
2. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
3. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc Type Apparatus.

4. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
5. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
6. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
7. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile.
8. ASTM D6241 - Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

1.03 DEFINITIONS

A. Backfill Material: Soil material, controlled density fill material or lean concrete used to fill an excavation.

B. Base Course Material: Satisfactory imported soil materials that are either provided on top of the prepared subgrade or subbase materials. See Plan sections and details.

C. Bedding Material: Imported soil material placed in the bottom portion of the pipe zone backfill that provides pipe support.

D. Borrow or Import Soil Materials: Approved soil materials provided from offsite sources. See PART 2 for specific borrow or import soil material requirements.

E. Building Footing Earthen Foundation: An earthen foundation located below a building footing.

F. Common Backfill Material: Common soil material used for backfill.

G. Common Fill Material: Common soil material used for fill.

H. Common Soil Material: Satisfactory native soils. If excavated common soils are used onsite, they shall comply with the respective aggregate specification for the intended use.

I. Drain Backfill Material: Imported soil materials used to backfill around a subdrain, wall drain, footing drain or roof drain to the required Plan dimensions.

J. Drainage Course Material: Course supporting the building slab on grade that also minimizes upward capillary flow of pore water.

K. Earthen Foundation: A foundation consisting of earthen soil materials. See “rock filled trench” definition.

L. Excavatable Flowable Fill: Lean cement concrete fill used where future excavation may be required such as fill for utility trenches, bridge abutments, and culverts.

M. Fill Material: Soil materials used to raise existing grades.

N. Final Backfill Material: Soil backfill material placed over the pipe zone backfill to subgrade.

O. Non Excavatable Flowable Fill: Lean cement concrete fill used where future excavation is not anticipated such as fill below structure foundations and filling abandoned utilities.

P. Pipe Zone Backfill Material: Soil backfill material placed below, around and above utility piping. Pipe zone dimensions are shown on the Plans.

Q. Satisfactory Soil Materials: Soil material conforming to requirements stated in PART 2 of this Section.

R. Subbase Material: Satisfactory imported soil materials that are provided on top of the prepared subbase subgrade. See Plan sections and details.

S. Subbase Subgrade: Surface or elevation remaining after completing an excavation or stripping in which subbase materials are constructed upon. See plan sections and details.

T. Subgrade: Surface or elevation remaining after completing an excavation or fill / embankment or backfill that subsequent imported soil materials and / or surfacing sections are constructed upon. See plan sections and details.

U. Top Course Material: Satisfactory imported soil materials that are either provided on top of the prepared subgrade, subbase or base course materials. See Plan sections and details.

V. Unsatisfactory Soil Materials: Soil material that does not conform to satisfactory soil material requirements.

W. Unsuitable Soil Material: Native soil material that is not suited or approved for project installation.

1.04 SUBMITTALS

A. Product Data: Submit data for geotextile fabric indicating fabric and construction.

B. Materials Source: Submit name of imported fill materials suppliers.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements. Provide documentation from an independent third-party qualified testing agency indicating and interpreting test results for compliance of specified soil materials.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with Washington State Department of Transportation 2022 Standard Specifications, 2021 City of Tacoma Stormwater Management Manual, and Port of Tacoma requirements.

B. Maintain one copy of each document on site.

C. Provide each material from single source throughout the Work.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

A. Structural Fill as specified in Section 31 05 16 - Aggregates for Earthwork.

B. Crushed Surfacing Top Course as specified in Section 31 05 16 - Aggregates for Earthwork.

C. Trench Bedding and Backfill as specified in Section 31 23 33 - Trenching and Backfilling.

D. Common Soils as specified in Section 31 05 16 - Aggregates for Earthwork.

E. Controlled Density Fill: According to WSDOT 2-09.3(1)E.

2.02 ACCESSORIES

A. Geotextile fabric: Shall comply with plan requirements.

1. Stabilization Geotextile: Woven geotextile fabric, manufactured for soil stabilization applications made from polyolefins or polyesters with elongation less than 50 percent complying with WSDOT 9-33.2(1) Table 3 requirements:

a. Grab Tensile Strength: 315 lbf; ASTM D4632

b. Sewn Seam Strength: 270 lbf; ASTM D4632

c. Tear Strength: 112 lbf; ASTM D4533

d. Puncture Strength: 620 lbf; ASTM D6241

e. Apparent Opening Size: No. 40 U.S. Sieve, Maximum; ASTM D4751

f. Permittivity: 0.10 per second; ASTM D4491

g. UV Stabilization: 50% after 500 hours exposure; ASTM D4355

2. Filter Fabric: Unless otherwise specified in the approved Plans, the geotextile fabric for infiltration trenches shall be Mirafi 500X, or approved equal complying with the following requirements:

a. Grab Tensile Strength: 200 lbf; ASTM D4632

b. Trapezoidal Shear Strength: 75 lbf; ASTM D4533

c. CBR Puncture Strength: 700 lbf; ASTM D6241

d. Apparent Opening Size: No. 40 U.S. Sieve; ASTM D4751

e. Permittivity: 0.05 per second; ASTM D4491

f. Flow Rate: 4 gpm/ft2; ASTM 4491

PART 3 - EXECUTION

3.01 GENERAL

A. Project Phasing and Sequencing: General project phasing and sequencing requirements are described in the civil plans. The Contractor shall comply with all general project phasing and sequencing requirements.

B. Supplemental Project Sequencing / Scheduling requirements: The Contractor shall expect to perform Earthwork operations during rainy / wet weather conditions in the spring, summer, fall, and winter months. The Contractor shall implement and employ means and methods necessary to provide satisfactory installations in accordance with Plan and Specification requirements within the project schedule time frame. Schedule Earthwork operations to minimize existing earthen soil disturbances. The Contractor's ability to perform Earthwork with moisture sensitive soils may be impossible and may require the contractor to cease Earthwork operations until some soil healing occurs. Time delays caused by the contractor's inability to perform Earthwork operations with existing saturated soils shall not be the basis for additional money or time claims. Inactive workdays or wet weather days shall be expected and planned for in the Contractor's schedule and bid without extra cost to the Owner, except in abnormal wet weather cases. Extreme wet weather cases shall be only considered over a monthly time period versus per storm, daily or weekly basis. Abnormal wet weather cases shall be only in accordance with contract General Condition requirements.

C. Earthwork Protection: All earthwork located in the project work areas, including but not limited to required project excavations, fills and backfills, and soil material stockpiles shall be protected from the weather. Protect installed structural areas (areas that have received the required structural fill) from deterioration at all times. Deterioration may include but not be limited to soft spots created from heavy equipment activity, repeated equipment activity or surface contamination from tracking nonstructural soils to these structural pads. In any case, deterioration caused by the Contractor's operations shall be repaired at the Contractor's expense.

D. Mining Onsite Materials: Mining onsite materials for offsite export use is prohibited.

E. Construction Water: All water required for construction shall be acquired / provided by the Contractor. Existing fire hydrants may be utilized for construction water provided the Contractor coordinate and obtain approval from the City of Tacoma. The Contractor shall be responsible to pay for all metering and water charged required for providing construction water.

F. Earthwork Volumes: Earthwork fills and backfills shall be with required satisfactory soil materials in accordance with requirements stated in this Section and the Plans. The Contractor shall be entirely responsible to provide satisfactory soil volumes to meet design grades. In the event that unsatisfactory soil volumes exceed satisfactory soil volumes either because of existing saturated native soil conditions (unsuitable soil / unforeseen conditions) or because of improper contractor soil protection management methods, the Contractor shall provide satisfactory imported soils in volumes to meet common fill and backfill requirements. All costs to provide satisfactory soils shall be included in the Contractors bid and shall not be the basis of additional costs for the Owner. The contractor shall be compensated for all costs related to replacement of the existing unsuitable soils – refer to Section 3.05.C.1.b. Excess soil material volumes shall be disposed of in accordance with requirements stated herein this Section.

G. Earthwork Protection: All Earthwork located in the project work areas, including but not limited to required project excavations, fills and backfills, soil material stockpiles shall be protected from the weather.

   1. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.

   2. Grade excavation top perimeter to prevent surface water runoff into excavation or to adjacent properties.

H. Material Storage: Stockpile satisfactory materials until required for backfill or fill. Stockpile borrow or imported soil materials and satisfactory soil materials without intermixing or contamination. Place, grade and shape stockpiles for proper drainage. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees. Comply with project phasing and sequencing requirements and earthwork protection requirements stated herein. Protect and cover exposed earthen material soil stockpiles in accordance with Plan and Specification requirements.

I. Site Accessibility: Coordinate with the Plan requirements.

J. Explosives: Explosive blasting is strictly forbidden.

K. Survey Control: Establish horizontal and vertical control as required to execute the work.

L. Traffic Control: Installation and maintenance of all required traffic control work for installation of street improvements is incidental to Earthwork.

M. Existing Utilities: Notify utility agencies as required by state laws prior to commencing earthwork operations. Locate existing underground utilities in areas of work. Expose existing utilities when necessary to ensure that no grade conflict exists with utilities. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Do not interrupt existing utilities except when permitted in writing by Utility. Temporary utility services may be required. Provide minimum of two working days' notice to Utility, Engineer and Owner and receive written approval to proceed before interrupting utility.

N. Utility Interruption: Do not interrupt existing utilities serving facilities occupied and used by others except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided. Provide minimum of two working days' notice to utility agency and Engineer and receive written notice to proceed before interrupting utility.

O. Protection: Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

3.02 EXAMINATION

A. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

B. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

C. Verify structural ability of unsupported walls to support loads imposed by fill.

3.03 PREPARATION

A. Call Utility Line Information service at 1-800-424-5555 and private locates not less than two working days before performing Work:

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours and datum.

C. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

D. Maintain and protect existing utilities to remain.

E. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.

F. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

G. Compact subgrade to density requirements for subsequent backfill materials.

H. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent fill material.

I. identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

J. Underpin adjacent structures which may be damaged by excavation work.

3.04 EXCAVATION

A. Topsoil Excavation: Excavate topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials for use in finish grading.

1. Do not excavate wet topsoil.

2. Do not remove topsoil from site.

B. Unclassified Excavation: Excavate to required subgrade elevations, lines and grades within specified tolerances regardless of character of materials and obstructions encountered unless otherwise directed by the Engineer. Unsuitable soils located within contract unclassified excavation limits shall be removed as unclassified excavation, disposed of in accordance with requirements stated herein this Section. Unsatisfactory soils located within contract unclassified excavation limits shall be removed as unclassified excavation and either processed to comply with common fill or backfill material requirements or disposed of offsite and shall not be the basis of additional costs. All unclassified excavation shall become the property of the contractor.

C. Protection of Persons and Property: Minimize extent of open excavations after regular working hours. Barricade open excavations occurring as part of this work and post warning lights. Operate warning lights as recommended by authorities having jurisdiction. Slope sides of excavations to comply with WAC 296-155, OSHA, WISHA, local codes and ordinances having jurisdiction.

D. Structural Area Excavation Criteria: Structural areas shall require unclassified excavations to either subgrade or subbase subgrade in accordance with Plan requirements and shall be included in the contractor's bid.

E. Other Onsite Structural Area Excavations:

1. Excavation for Miscellaneous Structural Area Improvements: Excavation for site retaining walls shall comply with cross sections, elevations and grades as shown in the Plans.

2. Excavation for Asphaltic Pavements: Excavate surface under pavements to comply with cross sections, elevations and grades as shown in the Plans.

3. Excavation for Concrete Pavements: Excavate surface under pavements to comply with cross sections, elevations and grades as shown in the Plans.

F. Onsite Nonstructural Area Excavations:

1. Excavation in Slope Areas: Prior to placement of fill/embankments, excavate or key into the existing slopes to common fill subgrades in accordance with Plan requirements.

2. Excavations for Bioretention Facilities: Excavate to required lines, grades and subgrades shown on the Plans.

G. Excavation Near Trees That Remain: Paint root cuts of one inch diameter and larger with emulsified tree paint. Coordinate with Landscape Plan.

H. Stripping: Excavate or strip all sod and organic material within the grading limits prior to commencing required unclassified excavations and / or backfills. All required stripping shall be included in the contractors bid. The average stripping depth is approximately six inches in the existing sod areas. The stripping depth in existing planter areas varies. Dispose of strippings in accordance with disposal requirements stated herein this Section.

I. Construction of utility vault and trenches in contaminated soils/groundwater:

1. HASP: Prepare and implement a project-specific health and safety plan (HASP) in accordance with 29 Code of Federal Regulations (CFR) 1910.120, Chapter 296-843 of the Washington Administrative Code (WAC), Chapter 296-155 WAC, and other applicable health and safety regulations that would contain procedures for any worker exposure air monitoring in vault air and personal protective equipment for any worker contact with groundwater in the utility vault

2. HAZWOPER: Use of 40-hour hazardous waste operations and emergency response (HAZWOPER)- trained personnel with current refresher certifications for all excavation-related activities.
3. Equipment Decontamination: Decontaminate all equipment parts (e.g., excavator bucket) in contact with soil within the utility before the equipment is used for other activities (e.g., conduit trenching, demobilization from the eastern parking lot area).
4. Soil Disposal: Provide temporary storage, characterization, and off-site disposal at a facility permitted to receive the waste for all excavated soil that cannot be returned to its original location.
5. High Tide: Consider the potential impacts of shallow GW during high tides during design of the utility vault to help ensure there will not be construction or long-term operation/maintenance issues associated with the utility vault. Perform utility vault construction activities during lower tides if feasible. Install an impervious or low-permeability barrier along the bottom and lower sides of the utility vault excavation to minimize the potential for GW to enter the utility vault during post-construction high tide events.
6. Groudwater Disposal: Temporary storage, characterization, and off-site disposal at a facility permitted to receive the waste is recommended for any groundwater that is removed from the utility vault during construction.
7. Vault Air: Consider the potential exposure to cis-DCE and VC in utility vault air by long-term vault maintenance workers. Vault air monitoring shall be conducted before, during, and/or following vault construction to determine if the cis-DCE and VC concentrations in vault air pose an exposure concern for maintenance workers. Install a vapor barrier along the bottom and sides of the utility vault excavation to minimize potential transport of cis-DCE and VC from groundwater to vault air. Refer to 31 23 33 Trenching and Backfilling for barrier specifications.

3.05 EXCAVATION TO GRADE OR SUBGRADE INSPECTION

A. Excavation to Grade Inspection: The contractor shall schedule, coordinate and safely allow the Engineer to inspect the condition of soils upon completion of all excavations to grade. The Engineer may require a probe test, a proof roll test or some other test to verify the condition of the soils at the excavation to grade elevation prior to placement of subsequent fills / backfills. For example, in a trench excavation, the required excavation to grade shall be located at the foundation grade. The Engineer may inspect and / or test the foundation grade for soil firmness/stability prior to the placement of subsequent trench bedding and backfill materials. Another example, in an area where required excavation of stripping and topsoil to grade is complete, the Engineer shall inspect and / or test the soils at the excavation to grade elevation for soil firmness / stability prior to the placement of subsequent backfill and / or fill materials. Should the Engineer determine that the soils located at the excavation to grade elevation are firm / stable, subsequent backfill and fill installation work may continue in accordance with backfill and fill provisions herein. Should the Engineer determine that the soils located at the excavation to grade elevation are not firm / stable, the Engineer may determine that overexcavation or other corrective measures be implemented.

B. Excavation to Subgrade for Base and Top Course Inspection: The contractor shall complete all excavations to subgrade for base and top course locations. Excavation to subgrade for base and top courses shall be defined as required excavation to base and top course subgrades.

C. Subgrade Inspection:

1. Should the subgrade surface area reveal a soft spot, the Contractor shall perform the following depending on the observed conditions:

    a. Satisfactory soils and insufficient compaction: The existing native soil grade or subgrade is “soft” because of insufficient compaction. The Contractor shall excavate the top 12 inches of the grade or subgrade, scarify and compact the soil until the proof roll test passes. “Soft spot” excavations resulting from insufficient compaction of existing soils are incidental to the subgrade preparation work.

    b. Unsuitable soils: The existing native soil grade or subgrade is “soft” because of unsuitable soils. The Contractor shall obtain authorization to remove and dispose of the unsuitable soils, backfill the excavation, compact the backfill and be reimbursed in accordance with authorized overexcavation and backfill change order provisions.

    c. Unsatisfactory soils due to excessive moisture: The existing native soil grade or subgrade is “soft” because of excessive moisture. The Contractor shall seek the Engineer’s corrective recommendation, obtain authorization to perform the corrective action from the Engineer and Owner prior to executing the corrective action. Reimbursement shall be in accordance with contract change order provisions.

D. Repair: Reconstruct grades, subgrades and damage by freezing temperatures, frost, rain, accumulated water, contamination of soils or construction activities, as directed by Engineer, without additional compensation.

3.06 UNAUTHORIZED OVEREXCAVATION AND BACKFILL

A. Unauthorized Overexcavation: Unauthorized overexcavation is the excavation of soil materials beyond contract lines and grades without specific authorization from the Engineer / Owner. Unauthorized overexcavation shall be at the Contractor’s expense.

B. Unauthorized Overexcavation Fill or Backfill: Unauthorized overexcavation fill or backfill is the installation of fill or backfill materials in unauthorized overexcavations to required contract lines, grades and subgrades without specific authorization from the Engineer / Owner. Unauthorized overexcavation shall be filled or backfilled in accordance with authorized overexcavation fill or backfill requirements stated herein or as directed by the Engineer. Unauthorized overexcavation fill or backfill shall be at the Contractor’s expense.

C. Fill or Backfill unauthorized overexcavation under building footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Or lean concrete fill, with 28-day compressive strength of 2,500 psi, may be used when approved by Engineer.

3.07 AUTHORIZED OVEREXCAVATION AND BACKFILL

A. Authorized Overexcavation and Backfill: Authorized overexcavation and backfill shall be determined by the Engineer and authorized by the Engineer / Owner prior to commencing the actual overexcavation and backfill work. Authorized overexcavation is the excavation of soil materials beyond contract lines and grades and the subsequent backfill to contract lines and grades prior to overexcavation for the following cases:

1. Unsuitable soil materials that are exposed at the bottom of required excavation to lines, grades and subgrades. Authorized overexcavation and backfill for this case shall be reimbursed in accordance with contract change order provisions.

2. Existing “soft spot(s)” soils caused by excessive moisture in native soils located at the bottom of required excavation to lines, grades and subgrades, especially in structural areas. “Soft spots” may be encountered during execution of the work. The Contractor shall obtain authorization for each excessive moisture “soft spot” overexcavation and backfill case on a location-by-location basis. Authorized overexcavation and backfill for this case shall consist of excavation below the required lines, grades and subgrades remove “soft spots” encountered in execution of work and the subsequent backfill of authorized materials. Authorized excessive moisture “soft spot” overexcavation and backfill for this case shall be reimbursed in accordance with contract change order provisions.
3. Existing “soft spot” locations caused by insufficient compaction of existing native soil (the moisture content and soils are satisfactory). Overexcavation and backfill for this case is incidental to the base bid work (see EXCAVATION TO GRADE OR SUBGRADE INSPECTION requirements herein this Section).

B. Authorized overexcavation and backfill quantities shall be quantified immediately after the overexcavation and backfill work limits are defined. The Engineer and the Contractor shall agree in writing to the in place, neat line, field measured authorized overexcavation and backfill quantities. The Contractor shall prevent and protect the existing native soil grades from any deterioration. Deterioration of either the native soil grades or overexcavation and backfill grades as a result of, but not limited to, scheduling and sequencing of work, construction and equipment operations, working hours and weather shall not be the basis for additional authorized overexcavation. Should overexcavation be required to repair deteriorated grades, the overexcavation and backfill repair work shall be unauthorized overexcavation. The Contractor shall record all authorized overexcavation and backfill locations on the Record Drawings.

3.08 BACKFILLING

A. General: Place and compact backfill and fill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, damp proofing, waterproofing and perimeter insulation.
2. Surveying and recording locations of underground utilities for Record Documents.
3. Inspection, testing, approval of subgrades.
4. Testing and inspecting underground utilities.
5. Removing concrete formwork.
6. Removing trash and debris.
7. Removing temporary shoring and bracing and sheeting and backfilling of voids with satisfactory materials.

B. Placement: Prior to placement of any satisfactory soil material, the Owner's retained testing agency shall approve the subgrade compaction for conformance with the specifications. Place fills / embankments or backfills in layers according to project Plans. Before compaction, moisten or aerate each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are unsatisfactory, muddy, frozen or contain frost or ice.

C. Structural Area Fill / Backfill Criteria: Structural areas shall require satisfactory soil materials above grades in accordance with Plan and Specification requirements and shall be included in the contractor's bid.

D. Fill and Backfill Adjacent to Structures: Fill and backfill materials adjacent to structures shall be per Plan requirements. Place fill and backfill materials evenly, adjacent to structures, to required elevations. Maximum lift thickness shall conform to Plans. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift. Backfill within two horizontal feet of the building walls shall be compacted to 90% and shall not be installed with heavy equipment such as vibratory rollers or hoepacs.

E. Other Onsite Structural Area Fills or Backfills:

1. Fills or Backfills for Miscellaneous Structural Area Improvements: Fills to subbase subgrade for site retaining walls shall be common fill material unless otherwise shown on the Plans. Install fills to comply with cross sections, elevations and grades as required in the Plans and Specifications.

2. Fills for Asphaltic Pavements: Fills to subgrade for asphaltic pavements shall be common fill material unless otherwise shown on the Plans. Install fills to comply with cross sections, elevations and grades as required in the Plans and Specifications. Pavement section materials are specified on the Plans and specification Section 32 12 16.01 – Asphalt Pavement.

3. Fills for Concrete Pavement: Fills to subgrade for concrete pavements shall be common fill material unless otherwise shown on the Plans. Install fills to comply with cross sections, elevations and grades as required in the Plans and Specifications. Pavement section materials are specified on the Plans.

F. Onsite Nonstructural Areas Backfill or Fills: Backfills or fills / embankments in nonstructural areas shall be with common fill or backfill soil material unless otherwise specified.

G. Backfill and Fill within Tree Protection Zone: Backfill within the tree protection zone shall be performed with light equipment. The use of heavy equipment, such as dozers, loaders, excavators and rollers shall be prohibited. The contractor may submit for Engineer's consideration to allow the use of heavy equipment provided they do the following:

1. Retain a certified arborist.

2. The arborist and the contractor prepare and submit a detailed work plan that will allow the use of heavy equipment without causing damage to the tree system.

3. Obtain written Engineer approval.

H. Backfill areas to contours and elevations with unfrozen materials.

I. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

J. Contractor shall coordinate with Engineer upon completion of subgrade preparation. Engineer will advise contractor where geotextile fabric may be needed under various finish surface conditions.

K. Place fill material in continuous layers and compact in accordance with Plans.

L. Employ placement method that does not disturb or damage other work.

M. Maintain optimum moisture content of backfill materials to attain required compaction density.

N. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

O. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

P. Make gradual grade changes. Blend slope into level areas.

Q. Leave fill material stockpile areas free of excess fill materials.

3.09 FILL OR BACKFILL TO SUBGRADE INSPECTION

A. Upon completion of the contract fill and backfill to subgrades in structural areas, the Contractor shall compact the subgrades to depth and percentage of maximum density for each area classification.

B. Should the subgrade surface fail the compaction test and / or a soft spot be revealed, the Contractor shall excavate the failed areas, recompact and / or replace and recompact the affected areas. Replacing and recompacting soils will be incidental to fill and backfill work. The soil will be retested and must pass a subsequent compaction test.

3.10 GRADING

A. General Grading: Grade areas to conform to required lines, grades and subgrades specified herein. Work shall include, but not be limited to, preparation of native material to receive backfill and fills, excavating and removal of native materials, providing various imported soil materials, grading and compacting soils to the design subgrade elevations. All areas around the building pad shall be graded to provide positive drainage away from the building. During construction positive drainage shall be provided at roadways, parking and staging areas being driven on and other areas as necessary for construction. Positive drainage shall be accomplished by establishing grades as designed or by interim methods as necessary.

1. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subgrade. Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines and elevations indicated.

2. Compaction: After grading, compact subgrade surfaces to depth and percentage of maximum density for each area classification.

3. Structural Areas: Shape all subgrades to required lines and grades within one half inch above or below required subgrade elevations.

3.11 TOLERANCES

A. Uniformly grade areas within grading limits, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades. Finish surfaces free of irregular surface changes and as follows:

1. Nonstructural Areas: Establish final subgrade areas to receive topsoil mix no more than 0.10 feet above or below required subgrade elevations. The Contractor shall ensure subgrade grade prior to placement of topsoil materials. There shall be no spoils, loose material, ridges, valleys, etc., remaining on the subgrade prior to placement of topsoil materials.

2. Structural Areas: Shape all subgrades to required lines and grades within one half inch above or below required subgrade elevations.

3.12 SOIL MOISTURE CONTROL

A. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, provide water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to satisfactory value. Moisture control will be incidental to Earthwork with no additional cost to the Owner.

B. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within two percent of optimum moisture content.

C. Do not place backfill or fill soil material on surfaces that are muddy, frozen or contain frost or ice.

D. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by two percent and is too wet to compact to specified dry unit weight at contractor's expense.

3.13 FIELD QUALITY CONTROL

A. General: Coordinate, schedule, notify and allow testing service to inspect and approve fill / backfill layers before further construction work is performed. Independent testing agency employed by Owner will perform inspections and testing as specified below: Give advance notice and allow testing service to inspect subgrades and fill layers before further construction work is performed. Testing service shall perform field density tests in accordance with ASTM D 1557 as applicable. Should native soils be inconsistent in gradation for agency testing, professional judgment and observations by the Owner's Engineer shall be utilized to determine compaction acceptability.

B. Structural Area Subgrade: Testing service will make at least one field density test of subgrade for every 2,000 square feet of paved area, but in no case less than three (3) tests. In each compacted fill layer, testing service will make one field density test for every 2,000 square feet of overlying paved area, but in no case less than three (3) tests. If, in the opinion of the Engineer, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, provide additional compaction for retesting.

C. Retesting: If additional testing is required due to failure of areas tested, contractor shall pay for such retesting by Owner's testing agency.

D. When testing agency reports that subgrades, fills, or backfills have not achieved specified compaction, scarify and moisten or aerate or remove and replace soil to depth required; recompact and retest until specified compaction is obtained. Contractor re-work to obtain subgrade approval is incidental to fill and backfill work and shall not be the basis for additional costs from the owner.

E. Perform in place moisture tests in accordance with ASTM D3017.

3.14 PROTECTION OF FINISHED WORK

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

C. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions at no additional cost to the Owner.

1. Scarify or remove and replace soil material to depth as directed by the Engineer; reshape and recompact.

2. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

3. Restore appearance, quality, and condition of finished surfacing to match adjacent work and eliminate evidence of restoration to greatest extent possible.

3.15 CONSTRUCTION WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Disposal of Surplus and Waste Materials: Dispose of all strippings, waste material, organics, trash and debris at an approved offsite disposal site. Unsuitable soils that are located within and removed while performing the required unclassified excavations shall be disposed of offsite at no additional cost to the Owner. All disposal costs shall be incidental to Earthwork and shall not be the basis for additional costs from the Owner.

B. Protection of Graded Areas: Protect graded areas from traffic and from becoming excessively wetted or eroded due to weather conditions. Keep free of trash and debris. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances at no additional cost to the Owner.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations, deterioration or adverse weather, repair prior to further construction with no additional cost to the Owner.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, retest and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work and eliminate evidence of restoration to greatest extent possible at no additional cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Coarse aggregate materials.
2. Fine aggregate materials.

B. Related Sections:

1. Section 03 30 00 – Cast-in-Place Concrete
2. Section 31 00 00 - Earthwork.
3. Section 31 10 00 - Site Clearing.
4. Section 31 23 33 - Trenching and Backfilling.
5. Section 32 12 16.01 - Asphalt Pavement.

1.02 REFERENCES

A. Washington State Department of Transportation 2022 Standard Specifications for Road, Bridge and Municipal Construction:

1. WSDOT 9-03.9(3) - Crushed Surfacing Top Course.
2. WSDOT 9-03.14(1) - Gravel Borrow.
3. WSDOT 9-03.21(1)A - Recycled Hot Mix Asphalt
4. WSDOT 9-03.1(2) – Sand, Class 2.

1.03 ASTM INTERNATIONAL:

1. ASTM C33 - Standard Specification for Concrete Aggregates.
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).

1.04 DEFINITIONS

A. Reference Section 31 23 33 - Trenching and Backfilling and Section 31 00 00 - Earthwork.

1.05 SUBMITTALS

A. Materials Source: Submit name of imported materials suppliers.

B. Manufacturer's Certificate: Certify Crushed Surfacing Top Course, Structural Fill, Recycled Aggregates, and Sand for Bedding meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

B. Perform Work in accordance with Washington State Department of Transportation 2022 Standard Specifications, 2021 City of Tacoma Stormwater Management Manual, and Port of Tacoma requirements.

C. Maintain one copy of each document on site.

PART 2 - PRODUCTS

2.01 COARSE AGGREGATE MATERIALS

A. Crushed Surfacing Top Course: Shall conform to WSDOT Section 9-03.9(3) requirements.

B. Structural Fill: Shall comply with WSDOT 9-03.14(1) Gravel Borrow requirements. There shall be one modification to the referenced WSDOT specification. The percent passing the #200 sieve shall be 5% versus 7%.

C. Recycled Aggregates: Use of recycled materials are acceptable on their own or blended with other materials provided the installed product conforms to requirements specified herein and to the following requirements:

1. Recycled concrete: Shall conform to WSDOT 9-03.21(1)B requirements.

2. Recycled asphalt: Shall conform to WSDOT 9-03.21(1)A requirements. Recycled asphalt materials are not acceptable either under or in the building pad soil materials and in trenches supporting utilities.

2.02 FINE AGGREGATE MATERIALS

A. Sand for Bedding: Shall comply with WSDOT Section 9-03.1(2) requirements.

B. Common Soils: Shall be existing native, naturally occurring soils. Excavated common soils may not be used onsite.

2.03 SOURCE QUALITY CONTROL

A. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557.

B. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557.

C. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not place aggregates over frozen or spongy subgrade surfaces.

3.02 EXCAVATION

A. Excavate aggregate materials from on-site locations indicated by Engineer as specified in Section 31 23 33 - Trenching and Backfilling and Section 31 00 00 - Earthwork.

B. Stockpile excavated material meeting requirements for coarse aggregate materials and fine aggregate materials.

3.03 BEDDING, BACKFILL AND FILL PLACEMENT

A. Place in accordance with Section 31 23 33 - Trenching and Backfilling and Section 31 00 00 - Earthwork.

3.04 STOCKPILING

A. Stockpile satisfactory soil materials onsite in accordance with Plan and Section 31 23 33 - Trenching and Backfilling and Section 31 00 00 - Earthwork requirements. Protect stockpiles from erosion and weather.

B. Stockpile materials on site at locations indicated by Engineer.

C. Stockpile in sufficient quantities to meet Project schedule and requirements.

D. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

F. Stockpile unsuitable hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.05 STOCKPILE CLEANUP

A. Leave unused materials in neat, compact stockpile.

B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to required grade and prevent free standing surface water.

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Removing surface debris.
2. Removing designated paving and fencing.
3. Removing designated trees, shrubs, and other plant life.
4. Removing abandoned utilities.

B. Related Sections:

1. Section 31 00 00 - Earthwork.
2. Section 31 05 16 - Aggregates for Earthwork.

1.02 REFERENCES

A. Washington State Department of Transportation 2022 Standard Specifications for Road, Bridge and Municipal Construction:

1. WSDOT 9-03.21(1)A - Recycled Hot Mix Asphalt

1.03 DEFINITIONS

A. Clearing: Remove and dispose of all unwanted material from the surface, such as trees, brush, down timber or other natural vegetation and material.

B. Grubbing: Remove and dispose of all unwanted vegetative matter from underground, such as, stumps, roots, buried logs or other debris.

C. Debris: All unusable natural material produced by clearing and grubbing.

D. Demolish / Demolition: Removal and disposal of the identified item in its entirety from the site.

E. Disposal: Loading, handling, transportation and deposition of the demolished item to an approved offsite location / source.

1.04 SCHEDULE

A. Coordinate this work with critical time schedule established for construction and take necessary measures to ensure schedule is met. As stated in General Conditions, take advantage of good weather and allowable daylight hours permitted by local ordinances as necessary to meet construction schedule. Coordinate with project phasing and sequencing requirements in PART 3 of this Section.

1.05 LAYOUT

A. Layout of all work under this Section shall be made at Contractor’s cost by a Washington State Licensed Land Surveyor who is acceptable to the Owner. The Land Surveyor will provide to the Owner at the Pre-Construction Conference a Certificate of Insurance as satisfactory evidence of professional liability insurance in an amount no less than $500,000 per claim.

1.06 ADJUSTMENTS

A. If any discrepancies are found by the Surveyor between the Drawings and actual conditions at the site, the Engineer reserves the right to make such minor adjustments in the work specified as necessary to accomplish the intent of the Contract Documents, without increased cost to the Owner.

1.07 PRE-WORK MEETING

A. The Contractor shall schedule and coordinate a preconstruction meeting with the Port's Inspector prior to commencing any project work. Comply with inspection requirements.

1.08 SUBMITTALS

A. Product Data: Submit data for herbicide. Indicate compliance with applicable codes for environmental protection.

1.09 QUALITY ASSURANCE

A. Perform Work in accordance with Washington State Department of Transportation 2022 Standard Specifications, 2021 City of Tacoma Stormwater Management Manual, and Port of Tacoma requirements.

B. Maintain one copy of each document on site.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Recycled Materials: Conform to Section 31 00 00 - Earthwork.

B. Herbicide: Approved by authority having jurisdiction.

PART 3 - EXECUTION

3.01 GENERAL

A. Project Phasing and Sequencing: General project phasing and sequencing requirements are described in the civil plans and specifications. The Contractor shall comply with all general and supplemental project phasing and sequencing requirements.

B. Supplemental Project Sequencing / Scheduling requirements: The Contractor shall expect to perform Site Clearing, Grubbing and Demolition work during rainy / wet weather conditions in the spring, summer, fall and winter months. The Contractor shall implement and employ means and methods necessary to execute site clearing, grubbing and demolition work in accordance with Plan and Specification requirements and within the project schedule time frame. Schedule work to minimize existing earthen soil disturbances. The Contractor's ability to perform site clearing, grubbing and demolition work with moisture sensitive soils may be impossible and may require the contractor to cease operations until some soil healing occurs. Time delays caused by the contractor's inability to perform work with existing moisture sensitive soils shall not be the basis for additional money or time claims. Inactive workdays or wet weather days shall be expected and planned for in the Contractor's schedule and bid without extra cost to the Owner, except in abnormal wet weather cases. Abnormal wet weather cases shall be only in accordance with contract General Condition requirements.

C. Traffic: Conduct site clearing, grubbing and demolition operations to ensure minimum interference with roads and other adjacent property. Do not close or obstruct streets or other occupied or used facilities without permission from authorities having jurisdiction.

D. Explosives: Use of explosives for clearing and grubbing work will not be permitted.

E. Clearing, Grubbing and Demolition Excavation and Backfill: Required excavations to perform clearing, grubbing and demolition work shall conform to Section 31 00 00 - Earthwork requirements. Excavations located in the street right of way or for onsite utilities shall be backfilled with materials in accordance with Section 31 00 00 - Earthwork requirements. Excavation and backfill work shall be incidental to Site Clearing, Grubbing and Demolition work.

3.02 EXAMINATION

A. Verify existing plant life designated to remain is tagged or identified.

B. Identify waste area and salvage area for placing removed materials.

3.03 PREPARATION

A. Call Utility Line Information service at 1-800-424-5555 and private locates not less than two working days before performing Work.

B. Request underground utilities to be located and marked within and surrounding construction areas.

Locate and flag clearing limits. Contractor shall limit their work to areas requiring clearing and grubbing only. Contractor shall refrain from entering areas not being worked in and shall repair all such disturbed areas.

3.04 PROTECTION

A. Locate, identify, and protect utilities indicated to remain, from damage.

B. Protect trees, plant growth, and features designated to remain, as final landscaping.

C. Protect bench marks, survey control points, and existing structures from damage or displacement.

D. Soil Protection: Existing soils exposed as a result of Clearing and Grubbing work shall be protected from the weather.

3.05 CLEARING AND GRUBBING

A. General: Remove trees, shrubs, grass, organics and other vegetation, improvements or obstructions interfering with construction within the Clearing and Grubbing limits. Take possession of timber within clearing and grubbing limits. Promptly remove such items off premises. Removal includes digging out stumps and roots in their entirety. Install stormwater pollution prevention measures prior to clearing and grubbing work.

B. Safety: Ensure safe passage of persons around area of clearing and grubbing. Conduct operations to prevent injury to adjacent buildings, structures, other facilities and persons and protect portions of existing facilities designated to remain.

C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place with six foot chain link fencing against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic or parking of vehicles within drip line.

D. Maintenance: Water trees and other vegetation to remain within limits of contract work as required maintaining their health during course of construction operations. Provide protection for roots over one and one half inch diameter cut during construction operations. Coat cut faces with emulsified asphalt or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

E. Damage: Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner acceptable to Engineer. Employ licensed arborist to repair damages to trees and shrubs. Replace trees that cannot be repaired and restored to full growth status as determined by arborist. Provide replacement trees that match existing in like kind (species and size).

F. Pruning: Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction.

G. Existing Facilities or Improvements: Provide protection necessary to prevent damage to existing facilities or improvements either on adjoining property or on Owner's property. Restore damaged facilities or improvements to their original condition, as acceptable to parties having jurisdiction. Clean the adjacent structures and facilities of dust, dirt and debris caused by clearing and grubbing operations as directed by Engineer or governing authorities. Return adjacent areas to existing condition prior to the start of work.

H. Backfill: Fill depressions caused by clearing and grubbing operations with satisfactory soil materials in accordance with Section 31 00 00 - Earthwork requirements.

3.06 REMOVAL

A. Remove debris, rock, and extracted plant life from site.

B. Partially remove paving and fencing as indicated on Drawings. Neatly saw cut edges at right angle to surface.

C. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.

D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.

E. Do not burn or bury materials on site. Leave site in clean condition.

F. Apply Herbicide to any stumps to prohibit growth.

3.07 DEMOLITION

A. Remove debris, rock and extracted plant life from site as noted on Drawings.

B. Partially remove paving, curbs and sidewalk as indicated on Drawings. Neatly saw cut edges at right angle to surface.

C. Pavement demolition:

1. General: Demolish designated concrete and asphalt pavements, curbs, curbs and gutters and walks designated on the plans. Make a vertical saw cut between any existing pavement, sidewalk, or curb that is to remain and the portion to be demolished. Replace any existing pavement, sidewalk or curb designated to remain that is damaged during the demolition work at no expense to the Owner. Coordinate demolition activities with Section 31 00 00 - Earthwork requirements.

2. Concrete: Existing onsite concrete may be crushed onsite for recycled application. Recycled onsite concrete application shall be limited to crushed surfacing soils (base course and top course) and quarry spall soils provided that they comply with their respective soil gradation requirements stated herein. Coordinate with Section 31 05 16 - Aggregates for Earthwork requirements.
3. Asphaltic Pavements: Existing onsite asphaltic pavements may be ground up / crushed for recycled application. Recycled onsite asphaltic pavements shall be blended with other soil materials such that the product complies with crushed surfacing base or top course material requirements and comply with WSDOT 9-03.21(1)A requirements. Or the recycled asphalt grindings may be used onsite as a subbase soil top dressing in proposed asphaltic pavement locations, such as asphaltic parking and road locations. The contractor shall limit the recycled asphalt top dressing thickness to a maximum depth of six inches. Onsite asphalt grinding materials may be used in onsite fills only under proposed asphalt pavement areas. The use of onsite recycled asphalt grindings is not acceptable under or in the building pads or other nonasphaltic pavement locations. Coordinate with Section 31 05 16 - Aggregates for Earthwork requirements.

Remove designated utilities. Show / detail the removal termination point for underground utilities on Record Documents.

D. Continuously cleanup and remove waste materials from site. Do not allow materials to accumulate on site.

E. Remove designated electrical poles, guy poles, guy wires, aerial and buried underground wiring.

F. Remove designated fencing and gates, including the concrete bases in their entirety.

3.08 CONSTRUCTION WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Disposal of Waste Material: Burning is not permitted onsite. Remove waste material promptly from Owner’s property. Dispose in accordance with local, State and Federal Regulations.

B. Do not burn or bury materials onsite. Leave site in clean condition.

END OF SECTION

This page intentionally left blank

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities.
2. Bedding and backfill for utilities.
3. Compaction.

B. Related Sections:

1. Section 03 30 00 – Cast-in-Place Concrete
2. Section 31 00 00 - Earthwork.
3. Section 31 05 16 - Aggregates for Earthwork.
4. Section 31 10 00 - Site Clearing.
5. Section 32 12 16.01 - Asphalt Pavement.

1.02 REFERENCES

A. Washington Administrative Code:

1. WAC 296-155 - Safety Standards for Construction Work.

B. ASTM International:

1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
2. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
3. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
4. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
5. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
6. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile.
7. ASTM D6241 - Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

1.03 DEFINITIONS

A. Backfill Material: Soil material, controlled density fill material or lean concrete used to fill an excavation.

B. Base Course Material: Satisfactory imported soil materials that are either provided on top of the prepared subgrade or subbase materials. See Plan sections and details.

C. Bedding Material: Imported soil material placed in the bottom portion of the pipe zone backfill that provides pipe support.

D. Borrow or Import Soil Materials: Approved soil materials provided from offsite sources. See PART 2 for specific borrow or import soil material requirements.

E. Common Backfill Material: Common soil material used for backfill.

F. Common Fill Material: Common soil material used for fill.

G. Common Soil Material: Satisfactory native soils. If excavated common soils are used onsite, they shall comply with the respective aggregate specification for the intended use.

H. Drain Backfill Material: Imported soil materials used to backfill around a subdrain, wall drain, footing drain or roof drain to the required Plan dimensions.

I. Drainage Course Material: Course supporting the building slab on grade that also minimizes upward capillary flow of pore water.

J. Fill Material: Soil materials used to raise existing grades.

K. Final Backfill Material: Soil backfill material placed over the pipe zone backfill to subgrade.

L. Native soils: Existing in situ project soils.

M. Nonstructural Area: A nonstructural area is a location on the project in which an improvement does not require structural capabilities. Landscaped planter beds and planting areas, playfields and lawn areas are examples of improvements located within nonstructural areas.

N. Overexcavation: Additional excavation below or beyond contract excavation lines, grades and subgrade elevations.

O. Overexcavation Fill or Backfill: Filling or backfilling an overexcavation.

P. Pipe Zone Backfill Material: Soil backfill material placed below, around and above utility piping. Pipe zone dimensions are shown on the Plans.

Q. Satisfactory Soil Materials: Soil material conforming to requirements stated in PART 2 of this Section.

R. “Soft Spot(s)”: A pocket or spot in the existing native soil subgrade that will not pass a proof roll test.

S. Structural Area: A structural area is a location on the project in which an improvement requires structural capabilities. Pavement areas, the entire building pad, site stairway structures, site seating and retaining walls, curbs and walks are examples of improvements located in structural areas.

T. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances or other man-made stationary features constructed above or below the ground surface.

U. Subbase Material: Satisfactory imported soil materials that are provided on top of the prepared subbase subgrade. See Plan sections and details.

V. Subbase Subgrade: Surface or elevation remaining after completing an excavation or stripping in which subbase materials are constructed upon. See plan sections and details.

W. Subgrade: Surface or elevation remaining after completing an excavation or fill / embankment or backfill that subsequent imported soil materials and / or surfacing sections are constructed upon. See plan sections and details.

X. Top Course Material: Satisfactory imported soil materials that are either provided on top of the prepared subgrade, subbase or base course materials. See Plan sections and details.

Y. Unclassified Excavation: The excavation of all materials to required lines, grades, subgrades, elevations and dimensions shown on the Plans.

Z. Unsatisfactory Soil Materials: Soil material that does not conform to satisfactory soil material requirements.

AA. Unsuitable Soil Material: Native soil material that is not suited or approved for project installation.

BB. Utilities: Underground pipes, conduits, ducts, and cables.

CC. Utility Structures: Underground vaults, catch basins, manholes and tanks used with utilities.

1.04 SUBMITTALS

A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

B. Product Data: Submit data for geotextile fabric indicating fabric and construction.

C. Material Certificates: Provide documentation from an independent third-party qualified testing agency indicating and interpreting test results for compliance of specified soil materials. Coordinate with Section 31 05 16 - Aggregates for Earthwork requirements. One certificate shall be provided for each of the following materials:

1. Backfill material
2. Bedding / pipe zone materials

D. Materials Source: Submit name of imported fill materials suppliers.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.05 PROJECT CONDITIONS

A. Schedule: Comply with critical time schedule established for construction and take necessary measures to ensure schedule is met. Take advantage of good weather and daylight hours permitted by local ordinances as necessary to meet construction schedule. Coordinate with project phasing and sequencing requirements described in PART 3 herein this Section.

B. Facilities: Develop all weather staging areas, temporary drainage facilities, temporary stormwater pollution prevention facilities and whatever methods and facilities are required to accomplish work within time schedule set and at cost bid. Review these areas and facilities with Owner and Engineer prior to implementation.

C. Adjustments: If discrepancies are found by the surveyor between the Drawings and actual conditions at the site, Engineer reserves the right to make such minor adjustments in the work specified as necessary to accomplish the intent of the Contract Documents, without increased cost to the Owner.

D. Survey Control Points: Carefully maintain benchmarks, monuments and other reference points. If disturbed or destroyed replace as directed.

E. Record Drawings: As-built drawings shall be prepared by the contractor. A Washington State Licensed Land Surveyor who is acceptable to the Owner shall prepare Record Drawings.

F. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Engineer not less than two workdays in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Engineer's written permission.
3. Contact utility locator service for area before excavating.

G. Weather: The Contractor is strongly advised to review the rainfall and weather records over the last three-year time period (2020 to present). Actual rainfall records over the last three-year period may vary from average normal (NOAA) rainfall totals. The actual rainfall may have saturated existing soils and / or raised localized perched groundwater tables on the site.

1.06 QUALITY ASSURANCE

A. Drawings and general provisions of the Contract apply to work specified in this Section.

B. Standards: Unless otherwise noted on the Plans, comply with most restrictive applicable provisions of Washington State Department of Transportation 2022 Standard Specifications for Road, Bridge and Municipal Construction; for utilities, comply with most restrictive applicable provisions of the specific utility Purveyor.

C. Perform Work in accordance with Washington State Department of Transportation 2022 Standard Specifications, 2021 City of Tacoma Stormwater Management Manual, and Port of Tacoma requirements.

D. Maintain one copy of each document on site.

1.07 QUALIFICATIONS

A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Washington.

1.08 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.09 COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

A. Bedding and Backfill materials shall be coordinated with Plan and Specification Section 31 05 16 - Aggregates for Earthwork requirements. The Contractor shall provide satisfactory bedding and backfill materials even if this requires that the Contractor import materials to accomplish the work. The importation of satisfactory soils and export of unsatisfactory soils shall be included in the Contractors bid cost.

B. Utility Trench Foundation Material: In accordance with Plan requirements or as directed by the Engineer.

C. Utility Trench Bedding and Backfill Materials: Pipe zone bedding and backfill materials shall comply with the approved plans and specification requirements.

D. Utility Structure Bedding and Backfill Materials: Bedding and backfill materials shall comply with the approved plans and specification requirements. Unless otherwise specified in the approved plans, pipe zone bedding for manholes and structures shall be crushed surfacing top course material. Unless otherwise specified in the approved plans, pipe zone backfill for manholes and structures shall be structural fill material. Onsite common soils may not be utilized in lieu of importing structural fill soils.

2.02 ACCESSORIES

A. Geotextile fabric: Shall comply with plan requirements. Unless otherwise specified in the approved Plans, the geotextile fabric for infiltration trenches shall be Mirafi 500X, or approved equal complying with the following requirements:

1. Grab Tensile Strength: 200 lbf; ASTM D4632
2. Trapezoidal Shear Strength: 75 lbf; ASTM D4533
3. CBR Puncture Strength: 700 lbf; ASTM D6241
4. Apparent Opening Size: No. 40 U.S. Sieve; ASTM D4751
5. Permittivity: 0.05 per second; ASTM D4491
6. Flow Rate: 4 gpm/ft2; ASTM 4491

B. Utility Detectable Warning Tape: Acid and alkali resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of six inches wide and four mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Storm and sanitary sewer systems.

C. Tracing Wire: Coordinate with plan requirements.

PART 3 - EXECUTION

3.01 GENERAL

A. Project Phasing and Sequencing: General project phasing and sequencing requirements are described in the civil plans and specifications. The Contractor shall comply with all general project phasing and sequencing requirements.

B. Supplemental Project Sequencing / Scheduling requirements: The Contractor shall expect to perform Trenching operations during rainy / wet weather conditions in the spring, summer, fall, and winter months. The Contractor shall implement and employ means and methods necessary to provide satisfactory installations in accordance with Plan and Specification requirements within the project schedule time frame. Schedule Trenching operations to minimize existing earthen soil disturbances. The Contractor's ability to perform Trenching work with moisture sensitive soils may be impossible and may require the contractor to cease Trenching operations until some soil healing occurs. Time delays caused by the contractor's inability to perform Trenching operations with existing saturated soils shall not be the basis for additional money or time claims. Inactive workdays or wet weather days shall be expected and planned for in the Contractor's schedule and bid without extra cost to the Owner, except in abnormal wet weather cases. Extreme wet weather cases shall be only considered over a monthly time period versus per storm, daily or weekly basis. Abnormal wet weather cases shall be only in accordance with contract General Condition requirements.

C. Earthwork Protection: All earthwork located in the project work areas, including but not limited to required project excavations, fills and backfills, soil material stockpiles shall be protected from the weather. Protect installed structural areas (areas that have received the required structural fill) from deterioration at all times. Deterioration may include but not be limited to soft spots created from heavy equipment activity, repeated equipment activity or surface contamination from tracking nonstructural soils to these structural pads. In any case, deterioration caused by the Contractor's operations shall be repaired at the Contractor's expense.

D. Mining Onsite Materials: Mining onsite materials for offsite export use is prohibited.

E. Construction Water: All water required for construction shall be acquired / provided by the Contractor. Existing fire hydrants may be utilized for construction water provided the Contractor coordinate and obtain approval from the City of Tacoma. The Contractor shall be responsible to pay for all metering and water charged required for providing construction water.

F. Traffic Control: All required traffic control work for Trenching operations is incidental to Trenching.

3.02 LINES AND GRADES

A. Design Grades and Slopes: Contractor shall meet the design grades and designated slopes for utility installations.

B. Lay pipes to lines and grades indicated on Drawings.

1. Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

C. Use laser-beam instrument with qualified operator to establish lines and grades.

****** [OR] ******

D. Maintain grade alignment of pipe using string line parallel with grade line and vertically above centerline of pipe.

1. Establish string line on level batter boards at intervals of not more than 25 feet.

2. Install batter boards spanning trench, rigidly anchored to posts driven into ground on both sides of trench.

3. Set three adjacent batter boards before laying pipe to verify grades and line.

4. Determine elevation and position of string line from elevation and position of offset points or stakes located along pipe route.
5. Do not locate pipe using side lines for line or grade.

3.03 PREPARATION

A. Existing Utilities: Notify utility agencies as required by state laws prior to commencing earthwork operations. Call Local Utility Line Information service at 1-800-424-5555 not less than two working days before performing Work. Request underground utilities to be located and marked within and surrounding construction areas. Expose existing utilities when necessary to ensure that no grade conflict exists with utilities. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Do not interrupt existing utilities except when permitted in writing by Utility and Engineer. Temporary utility services may be required. Provide minimum of two working days' notice to Utility, Engineer and Owner and receive written approval to proceed before interrupting utility.

B. Prework Meeting: The Contractor shall schedule and coordinate a preconstruction meeting with the Site Development Inspector prior to commencing any site development project work. Comply with inspection requirements. The Contractor shall schedule, coordinate and attend a preconstruction meeting with respective Utility Purveyors.

C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

D. Identify required lines, levels, contours, and datum locations.

E. Protect plant life, lawns, rock outcropping and other features remaining as portion of final landscaping.

F. Protect bench marks, existing structures, fences and paving from damage by excavating equipment and vehicular traffic.

G. Maintain and protect above and below grade utilities indicated to remain.

H. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.04 TRENCH EXCAVATION FOR UTILITIES

A. Trench excavation is unclassified excavation. Utility trench excavations are shown on the Plans. Trenches shall be excavated to the line and grade designated on the Plans or as required meeting proposed elevations. Unsuitable soils located within contract trench excavation limits shall be removed as unclassified excavation, disposed of in accordance with requirements stated herein this Section and shall not be basis for additional costs. Unsatisfactory soils located within contract trench excavation limits shall be removed as unclassified excavation and either processed to comply with common fill or backfill material requirements or disposed of offsite and shall not be the basis of additional costs. All unclassified excavation shall become the property of the contractor. Incidental to Trenching.

B. Trench sides shall be supported or shored as required to maintain safe working conditions and code requirements. Slope sides of excavations to comply with WAC 296-155, OSHA, WISHA, local codes and ordinances having jurisdiction. Provide and install timbering and sheeting, trench boxes and shoring as necessary to protect workers, work, existing utilities and other properties where sloping is not possible because of space restrictions or instability of material excavated. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing. Remove timbering and sheeting, trench boxes and shoring above pipe prior to backfilling.

C. Minimize extent of open excavations after regular working hours. Barricade open excavations occurring as part of this work and post warning lights. Operate warning lights as recommended by authorities having jurisdiction.

D. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (1 degree C).

E. Trenching operations shall not proceed more than 100 feet in advance of pipe laying except with written approval of the Engineer.

F. Trench widths to one foot above the top of the pipe shall not exceed 30 inches or 1.5 times the outside diameter of the pipe plus 18 inches, whichever is greater. Standard excavating equipment shall be adjusted so as to excavate the narrowest trench possible.

G. Provide uniform and continuous bearing and support for bedding material and pipe utilities. Provide excavation to the required lines, grades and subgrades.

H. Stockpile excavated material in area designated on site in accordance with Section 31 05 16 - Aggregates for Earthwork.

3.05 EXCAVATION FOR UTILITY STRUCTURES

A. Utility Structure Excavation: Excavation shall conform to Plan requirement lines, grades and cross sections. Comply with all shoring and trench protection requirements stated herein.

1. Provide excavation to the required lines, grades and subgrades.

3.06 EXCAVATION TO GRADE OR SUBGRADE INSPECTION

A. Trench Foundation: Provide firm earthen trench foundation for all utilities and structures. Should the trench foundation be “soft”, the contractor shall perform the following depending on the observed conditions:

1. Should the excavation to trench foundation grade reveal a “soft spot”, the Contractor shall perform the following depending on the observed conditions:

B. Satisfactory soils and insufficient compaction: The existing native soil at the trench foundation grade is “soft” because of insufficient compaction. The contractor shall excavate an additional 12 inches below the foundation level and compact the soil. Provide firm trench foundation. Incidental to trench foundation preparation.

C. Unsuitable soils: The existing native soil at the trench foundation grade is “soft” because of unsuitable soils. The Contractor shall obtain authorization to remove (overexcavate) and dispose of the unsuitable soils, backfill the overexcavation, compact the overexcavation backfill and be reimbursed in accordance with authorized overexcavation and overexcavation backfill provisions stated herein. Provide firm trench foundation.

1. Unsatisfactory soils due to excessive moisture: The existing native soil at the trench foundation grade is “soft” because of excessive moisture. The Contractor shall obtain authorization to remove (overexcavate) and dispose of the unsatisfactory soils, backfill the overexcavation, compact the overexcavation backfill and be reimbursed in accordance with authorized overexcavation and overexcavation backfill provisions stated herein. Provide firm trench foundation.
2. Repair: Reconstruct grades, subgrades and trench foundations damaged by freezing temperatures, frost, rain, accumulated water and contamination of soils or construction activities, as directed by Engineer, without additional compensation.

3.07 AUTHORIZED TRENCH OVEREXCAVATION AND BACKFILL

A. Authorized Trench Overexcavation and Backfill: Authorized trench overexcavation and backfill shall be determined by the Engineer and authorized by the Engineer prior to commencing the actual overexcavation and backfill work. Authorized trench overexcavation and backfill is the excavation of soil materials beyond Trenching contract lines, grades and subgrades and the subsequent overexcavation backfill for the following:

1. Existing “soft spot(s)” soils caused by either unsuitable soils or excessive moisture located in the trench foundation. “Soft spots” may be encountered during execution of Trenching work. The Contractor shall obtain authorization for each excessive moisture “soft spot” overexcavation and backfill case on a location-by-location basis. Authorized trench overexcavation and backfill for this case shall consist of trench foundation excavation below the bottom of pipe zone level to remove trench foundation “soft spots” encountered in execution of utility and / or utility structure work. Overexcavation backfill shall include the subsequent backfilling of the authorized trench overexcavation.
2. Authorized trench overexcavation and backfill quantities shall be quantified immediately after the trench overexcavation and backfill work limits are defined. The Engineer and the Contractor shall agree in writing to the in place, neat line, field measured authorized trench overexcavation and backfill quantities. The Contractor shall prevent and protect the existing native soil grades from any deterioration. Deterioration of either the native soil grades or overexcavation grades as a result of, but not limited to, scheduling and sequencing of work, construction and equipment operations, working hours and weather shall not be the basis for additional authorized overexcavation and backfill. Should overexcavation and backfill be required to repair deteriorated grades, the overexcavation and backfill repair work shall be unauthorized overexcavation. The Contractor shall record all authorized overexcavation and backfill locations on the Record Drawings.

3.08 UNAUTHORIZED TRENCH OVEREXCAVATION AND BACKFILL

A. Unauthorized Trench Overexcavation and Backfill: Unauthorized trench overexcavation and backfill is overexcavation trenching and backfilling beyond required contract lines, grades and subgrades without specific authorization from the Engineer. Unauthorized trench overexcavation work shall be backfilled in accordance with authorized overexcavation backfill requirements stated herein or as directed by the Engineer. Unauthorized trench overexcavation and backfill shall be at the Contractor’s expense.

3.09 TRENCH BACKFILLING FOR UTILITIES

A. Utility Foundation: Provide firm earthen trench foundation for all utilities.

B. Backfill utility trenches in accordance with Plan and specification requirements. Trench sides shall be supported or shored as required to maintain safe working conditions and code requirements. The trench shall be kept free from water until jointing is completed. Surface water shall be diverted so as not to enter the trench.

C. Utility Pipe Zone Backfill: Place and compact pipe zone bedding and backfill below, around and above the piping to the dimensions shown on the Plans, but not before completing the following:

1. Shape pipe zone bedding to provide continuous support for bells, joints and barrels of pipes and for joints, fittings and bodies of conduits.

2. Carefully compact pipe zone backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

3. Backfill voids located within the pipe zone backfill zone while as a result of installing and removing shoring and bracing with pipe zone backfill material.

D. Final Backfill: Place backfill up to 12 inches over top of pipe evenly and carefully, removing rock or other debris capable of damaging pipe from backfill material. Place final backfill in lifts not exceeding twelve inches in depth and compact to specified densities to subgrade in accordance with Plan and specification requirements. Install detectable marking directly above onsite utilities 12-18 inches below finished grade.

E. Special Utility Backfills: The following conditions require special backfill installations:

1. Should utility trench excavation be required in or through a structural area that has been previously overexcavated and filled or backfilled, the Contractor shall backfill the utility trench entirely with required final backfill materials to either subbase subgrade if the utility is located in an area requiring subbase materials and to subgrade in areas not requiring subbase materials. Repair the filter fabric (provide satisfactory overlap in accordance with manufacturer’s recommendations).

2. Unless otherwise shown on the Plans, backfill trenches excavated under footings with lean concrete to elevation of bottom of footings.

F. Backfill trenches to contours and elevations with unfrozen fill materials.

G. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

H. Placement: Prior to placement of any satisfactory soil material, the Owner's retained testing agency shall approve the grade for conformance with the specifications. Place fills / embankments or backfills in layers not more than twelve inches in loose depth for material compacted by heavy compaction equipment and not more than four inches in loose depth for material compacted by hand operated tampers. Employ placement method that does not disturb or damage utilities in trench. Before compaction, moisten or aerate each layer to required percentage of maximum dry density or relative dry density for each area classification.

I. Onsite Nonstructural Areas Backfill or Fills: Backfills or fills / embankments in nonstructural areas shall be imported backfill soil material.

J. Do not leave more than 50 feet of trench open at end of working day.

K. Protect open trench to prevent danger to Owner and/or the public.

3.10 BACKFILLING FOR UTILITY STRUCTURES

A. Utility Structure Earthen Foundation: Provide firm earthen foundation for all utility structures.

B. Utility Structure Bedding: Place and compact utility structure bedding material in accordance with Plan and specification requirements.

C. Utility Structure Pipe Zone Backfill: Place utility structure pipe zone backfill around the base of the utility structure and compact to specified densities in accordance with Plan and specification requirements.

D. Utility Structure Final Backfill: Place and compact utility structure final backfill at specified densities to subgrade in accordance with Plan and specification requirements.

3.11 TOLERANCES

A. Top Surface of Backfilling in Nonstructural Areas: Establish final subgrade areas to receive topsoil mix no more than 0.10 feet above or below required subgrade elevations. The Contractor shall obtain Engineer's approval of subgrade prior to placement of topsoil materials. There shall be no spoils, loose material, ridges, valleys, etc., remaining on the subgrade prior to placement of topsoil materials.

B. Top Surface Backfilling in Structural Areas: Shape all subgrades to required lines and grades within one half inch above or below required subgrade elevations.

3.12 FIELD QUALITY CONTROL

A. Perform laboratory material tests in accordance with ASTM D1557.

B. Perform in place moisture tests in accordance with ASTM D3017.

C. Utility Trenches: Provide in place density tests per ASTM D 1557, minimum of one (1) field density test for every 100 lineal feet of trench. Should soils be inconsistent in gradation and hoe pacs are used for trench compaction, professional judgment and observations by the Owner's Engineer shall be utilized to determine compaction acceptability.

D. Deep Utility Trenches: In trenches greater than six feet deep, provide in place density tests at mid trench depth and at subgrade elevation, minimum of one (1) field density test at each elevation for every 100 lineal feet of trench. The contractor shall provide a safe trench for the testing agency personnel to perform the compaction tests.

E. Utility Structures: Provide minimum of two in place density tests within backfill area adjacent to each catch basin, vault, and other utility structures.

F. If additional testing is required due to failure of areas tested, pay for such retesting by Owner's testing agency.

G. When testing agency reports that subgrades, fills, or backfills have not achieved specified compaction, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained. Contractor rework to obtain subgrade approval is incidental to Trenching.

3.13 PROTECTION OF FINISHED WORK

A. Protecting Trenching Installations: Protect newly installed trenching areas from traffic, freezing, erosion and deterioration. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions at no additional cost to the Owner.

C. Restore appearance, quality, and condition of finished surfacing to match adjacent work and eliminate evidence of restoration to greatest extent possible.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. The extent and location of “Trench Safety System” is indicated on the Contract Documents to be used in the excavation of trenches for the construction of the utilities.

1.02 GOVERNING CODES, STANDARDS, AND REFERENCES

A. R.C.W. Chapter 39.04.180 Public Works/Trench Excavations - Safety Systems Required

B. R.C.W. Chapter 49.17 WISHA Safety Standards (Current Edition)

C. WAC 296-155 Safety Standards for Construction Work (Current Edition)

1.03 SUBMITTALS

A. Submit materials data in accordance with of Section 01 33 00 – Submittal Procedures. Furnish manufacturers’ technical literature, standard details, product specifications, and installation instructions for all products. Submittals shall include the following:

PART 2 - MATERIALS - NOT USED

PART 3 - EXECUTION

3.01 PROJECT INFORMATION

3.02 PREPARATION FOR EXECUTION OF WORK

3.03 EXECUTION OF WORK

A. Shoring Or Extra Excavation

1. Trench Safety Systems or additional excavation shall be implemented on all utility trench excavations in excess of 4 feet in depth conforming to the referenced requirements.

2. The Contractor’s trench safety system shall be designed by a qualified person and meet the referenced requirements.

3. All excavation not included in trench safety systems shall also meet the WISHA safety standards and the requirements of Section 31 00 00 - Earthwork.

3.04 DELIVERABLES

A. Trench Safety System Plan

END OF SECTION

This page intentionally left blank

PART 1 - GENERAL

1.01 SCOPE

A. The work covered by this Section includes the furnishing of all labor, materials, equipment and necessary services to construct asphalt pavements to the sections and at the locations as specified in this Section and as indicated on the Contract Drawings.

B. The materials specified herein are intended primarily for use in repairing small areas less than 300 tons and performing emergency repairs under inclement weather conditions. Mix furnished shall be historic Hveem designs meeting the criteria provided below (Section 2.03).

1.02 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. Unless otherwise indicated, the most recent edition of the publication, including any revisions, shall be used.

C. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO M 17 – Mineral Filler for Bituminous Paving Mixtures
2. AASHTO M 332 – Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test
3. AASHTO T 11 – Materials Finer Than 75 □m (No. 200) Sieve in Mineral Aggregates by Washing
4. AASHTO T 27 – Sieve Analysis of Fine and Coarse Aggregates
5. AASHTO T 30 – Mechanical Analysis of Extracted Aggregate
6. AASHTO T 96 – Resistance to Degradation of Small-Size Coarse Aggregate and Impact in the Los Angeles Machine
7. AASHTO T 112 – Clay Lumps and Friable Particles in Aggregate
8. AASHTO T164 – Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)
9. AASHTO T 176 – Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
10. AASHTO T 283 – Resistance of Compacted Hot-Mix Asphalt (HMA) Mixtures to Moisture-Induced Damage
11. AASHTO T 304 – Uncompacted Void Content of Fine Aggregate
12. AASHTO T308 – Determining the Asphalt Binder Content of Hot Mix Asphalt (HMA) by the Ignition Method
13. AASHTO T 335 – Determining the Percentage of Fracture in Coarse Aggregate

D. American Society for Testing and Materials (ASTM)

1. ASTM D75 – Sampling Aggregates
2. ASTM D242 – Mineral Filler for Bituminous Paving Mixtures

E. Washington State Department of Transportation (WSDOT)

1. Construction Manual, M 41-01

2. Standard Specifications for Road, Bridge and Municipal Construction, M 41-10
3. Materials Manual, M 4601

1.03 SUBMITTALS

A. A separate job mix formula for each proposed mix design shall be submitted in writing by the Contractor upon execution of the contract. Submittals shall represent all submittal elements specified herein and shall include as a minimum:

1. Mix designation/identification number.
2. Plant where mix will be produced.
3. Performance Graded Binder Certified Test Reports
    a. Source location and type of binder.
    b. Certificate of Compliance, including date and signature of the supplier, regarding conformance with AASHTO M 332, Table 1.
    c. Compliance with WSDOT elastic recovery requirements in Section 9-02.1(4)
    d. Temperature-viscosity relationship of the asphalt cement.
    e. Minimum mixing temperature (degrees F).
    f. Minimum compaction temperature (degrees F).
4. Coarse Aggregate Certified Test Reports:
    a. Source location and type of aggregate.
    b. Fractured Faces.
    c. Bulk specific gravity.
    d. LA Abrasion.
5. Fine Aggregate Certified Test Reports:
    a. Source location and type of aggregate.
    b. Bulk specific gravity.
    c. Percent natural sand (if used).
    d. Sand equivalent.
    e. Uncompacted void content.
6. Anti-strip agent:
    a. Certification.
    b. Amount used.
7. Recycled Asphalt Pavement Test Reports (if used)
8. Percentage and grade of performance graded asphalt binder.
9. Proportions and percentage of each aggregate stockpile.
10. Temperature range of mix when discharged from the mixer.

11. Plot of the blended aggregate gradation and gradation control points on the Federal Highway Administration (FHWA) 0.45 power gradation curve.
12. Maximum specific gravity at the target binder content.
13. Air void content at the target binder content.
14. Graphical plots of air voids, voids in the mineral aggregate, voids filled with asphalt, fines to effective binder content ratio, and unit weight verses asphalt content. Plots shall indicate values at –0.5 percent design asphalt content, design asphalt content, and +0.5 percent design asphalt content.
15. Tensile strength ratio (TSR), strength of conditioned samples, and worksheets (Hveem).

B. The certification(s) shall show the appropriate AASHTO/ASTM test(s) for each material, test results, and a statement that the material meets the specification requirement.

C. If requested by the Engineer, submit samples for each type aggregate to be used and from each source with proper identification as to source, type of aggregate and contract number. Take all samples in accordance with requirements of ASTM D75 and D242. Submit in clean, sturdy bags and in the following amounts for each sample when requested:

MATERIAL	SAMPLE SIZE
Coarse Aggregate	25 lbs.
Fine Aggregate	25 lbs.
Reclaimed Asphalt Pavement	25 lbs.
Mineral Filler	5 lbs.

D. The job mix formula for each mixture shall be in effect until modified in writing by the Engineer. Should a change in mix or sources of materials be made, a new job mix formula must be tested and resubmitted for approved by the Engineer before the new mix is used.

E. Working Drawings: For each paving area, provide working drawings to show the following information:

1. Direction of paving.
2. Lane widths.
3. Thickness of each lift.

F. Submit smoothness measurements and surface grade survey results to the Engineer prior to application for payment.

1.04 CONTRACTOR QUALITY CONTROL

A. The Contractor shall be responsible for developing the asphalt mix designs specified herein. The mix designs shall be developed and/or certified by a laboratory accredited by AASHTO under the AASHTO resource program.

B. Quality Control Testing: The Contractor shall conduct any and all quality control (QC) testing that he deems necessary to properly control the quality, consistency, and uniformity of the asphalt concrete mix being produced. No minimum number of quality control tests is required for this Contract.

C. If the Contractor chooses to conduct quality control tests, the information and data determined through that testing shall be made available for inspection by the Engineer. In no case, however, shall the Contractor's quality control test data be used by the Engineer for acceptance or payment purposes.

D. Surface Grades: Grades shall conform to the tolerance requirements specified herein, except where closer tolerance is required for the proper functioning of appurtenant structures and drainage as determined by the Engineer.

1.05 QUALITY ASSURANCE

A. The Engineer will provide inspection services. Sampling and testing for compliance shall be in accordance with the applicable reference standards using certified technicians and accredited independent testing laboratories.

B. Sampling and testing for compliance with the Contract provisions shall be in accordance with Section 01 33 00 - Submittal Procedures and Section 01 45 00 - Quality Control.

C. The Contractor may obtain copies of results of tests performed by the Port from the office of the Port, at no cost. Tests conducted for the sole benefit of the Contractor, shall be at the Contractor's expense.

D. Unless otherwise referenced or modified herein, quality control and quality standards for this section shall be as specified in the WSDOT Standard Specifications.

1.06 JOB CONDITIONS

A. Environmental Requirements:

1. Weather limitations shall be in accordance WSDOT Standard Specifications Section 5-04.3(3), as modified herein.

2. In case of sudden rain, the Engineer may permit placing of mixture then in transport from the plant provided that the surface upon which the mix is being placed is free from pools of water. In addition, the laydown temperatures must conform to the above requirements. Such permission, however, shall not be interpreted as a waiver of any of the quality requirements.

B. New and existing manholes, catch basins, and utility vault covers shall be adjusted to conform to the new pavement grades. Paving shall be finished 1/4-inch to 1/2-inch higher than adjacent structures, unless otherwise shown or specified.

C. Existing Underground Utilities: The Contractor shall locate existing underground utilities in the area of the work. Those utilities which are to remain shall be adequately protected from damage.

D. All permanent utilities shall be installed prior to final paving. All utility trenches shall be patched with asphalt pavement as shown on the Contract Drawings.

E. Dust Control: The Contractor shall be responsible for dust control at the site. As a minimum, a water truck and vacuum truck shall be used on site for dust control when required by the Engineer.

PRODUCTS

2.01 PERFORMANCE GRADED ASPHALT BINDER (PGAB)

A. Asphalt shall conform to the requirements of AASHTO M 332, Table 1 and the elastic recovery requirements of WSDOT Standard Specification Section 9-02.1(4) for the Performance Grade specified herein.

2.02 AGGREGATE

A. Coarse Aggregate – Coarse aggregate shall conform to WSDOT Standard Specification Section 9-03.8, as modified below:

Test	Specification
Coarse Aggregate Angularity (AASHTO T 335)	90% with 2 or more fractured faces

B. Fine Aggregate - Fine aggregate shall consist of clean, sound, durable, angular shaped particles produced by crushing stone or gravel that meets the requirements for wear and soundness specified for coarse aggregate. Natural (non-manufactured) siliceous sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. The amount of sand to be added will be adjusted to produce mixtures conforming to requirements of this Specification. The aggregate particles shall be free from coatings of clay, silt, or other objectionable matter and shall contain no clay balls. Fine aggregate shall conform to WSDOT Standard Specification Section 9-03.8, as modified below:

Test	Specification
Uncompacted Void Content (AASHTO T 304, Method A)	44%, minimum
Deleterious Materials (AASHTO T 112)	2%, maximum
Wood Waste Retained on a No. 4 Sieve (Specific Gravity < 1.0)	0.1%, maximum

C. Mineral filler, when used, shall conform to the requirements of AASHTO M 17.

D. Recycled Asphalt Pavement (RAP)

1. RAP, if used, shall conform to the requirements of WSDOT Standard Specification Section 9-03.8(3)B, 9-03.21(1) and 9-03.21(1)A, as modified herein.

2. The maximum proportion of RAP permitted within each mix shall not exceed 20 percent.

3. RAP shall have 100 percent passing the 2-inch sieve, 95 percent passing the 1 inch sieve, and shall be a mixture of only coarse aggregate, fine aggregate, and asphalt cement, free of solvents and other contaminating materials.

4. When RAP is used in a mixture, the RAP aggregate shall be extracted from the RAP using a solvent extraction (AASHTO T164) or ignition oven (AASHTO T308). The RAP aggregate shall be included in determinations of gradation, coarse aggregate angularity, and fine aggregate angularity. The sand equivalent requirements shall be waived for the RAP aggregates but shall apply to the remainder of the aggregate blend.

5. Documentation of RAP stockpile quality and traceability shall be submitted to the Engineer for approval prior to use.

E. Aggregate Gradation

1. Each gradation contains maximum and minimum control points. Job mix formula gradations must fall within control points for the specified nominal aggregate size. The combined aggregate shall conform to the gradation requirements shown below when tested in accordance with AASHTO T 11 and T 27. Design gradation requirements are as follows:

Design Aggregate Gradation Control Points	
Sieve Size	Class B (1/2-inch)
	(Percent Passing)
1-1/2”	-
1”	-
3/4"	100
1/2"	90-100
3/8”	75-90
No. 4	46-66
No. 10	30-42
No. 40	11-24
No. 200	3.0-7.0

2. Aggregates shall be provided in sufficient sizes to produce a uniform mixture. The Contractor shall indicate on the proposed job-mix formula the separate size designations of aggregate to be used.

3. It is recommended that the Bailey Method of gradation evaluation be used to evaluate the packing of aggregate particles and constructability of the blended aggregate mix. If segregation or non-uniformity is evident in the finished pavement, the Engineer reserves the right to require the Contractor to discontinue the use of crusher run or aggregate blends and to furnish separate sizes of open graded aggregate material.

2.03 HVEEM HOT MIX ASPHALT (HMA) MIX DESIGN

A. Mix design shall be prepared using the Hveem mix design method in accordance with the 2011 WSDOT Materials Manual Test Method T 702, 2011 WSDOT Materials Manual Test Method T 703, and the 2002 WSDOT Standard Specifications, as modified herein. The 2011 WSDOT Materials Manual and the 2002 WSDOT Standard Specifications are referenced for mix design purposes only and the current edition of the WSDOT Standard Specifications is applicable to all other references.

B. Asphalt Binder: PG 58H-22.

C. Aggregate Gradation: Class B (1/2”).

D. Stabilometer Value: 35, minimum.

E. Cohesiometer Value: 100, minimum.

F. Air Voids: 2% – 4.5%.

G. The dust to binder ratio of the blended mix shall be between 0.6 and 1.6.

H. Compacted mix design shall have a tensile strength ratio (TSR) greater than or equal to 85 percent when tested in accordance with WSDOT Test Method T718, including the freeze-thaw cycle. In addition, the mixture shall have a minimum wet tensile strength of 80 pounds per square inch (psi). In the event the mix design does not meet the tensile strength requirements the Contractor shall increase the approved anti-stripping agent dosage or take other corrective action to satisfy the specification.

2.04 HEAT-STABLE ANTI-STRIPPING ADDITIVE

A. Mix designs shall include a minimum of 0.1 percent by weight binder, anti-stripping additive conforming to the requirements of WSDOT Standard Specification Section 9-02.4.

2.05 HMA ADDITIVE

A. An approved HMA Additive, to assist field compaction, meeting Section 9-02.5 of WSDOT Specifications, may be accepted by the Engineer.

2.06 TACK COAT

A. Unless otherwise approved by the Engineer, the tack coat shall be CSS-1, CSS-1h, or STE-1 emulsified asphalt conforming to WSDOT Standard Specification Section 9-02.1(6). The CSS-1 and CSS-1h emulsified asphalt may be diluted with water at a rate not to exceed one part water to one part emulsified asphalt. The tack coat shall not exceed the maximum temperature recommended by the emulsified asphalt manufacturer.

2.07 JOINT AND CRACK SEALANT

A. Sealant shall conform to the requirements of WSDOT Standard Specification Section 9-04.2(1).

EXECUTION

3.01 CONSTRUCTION METHODS

A. Asphalt Mixing Plant – Asphalt shall be produced at a plant approved by the WSDOT. Plants shall conform to WSDOT Standard Specifications Section 5-04.3(3)A.

B. Hauling Equipment:

1. Hauling equipment shall conform to WSDOT Standard Specifications Section 5-04.3(3)B, as modified herein.

2. Trucks shall be equipped with tarps, in good condition without holes, which can be tied down over the sides and ends of the truck beds during periods of inclement weather to prevent rain from entering the truck bed and coming in contact with the asphalt concrete mix.

3. Trucks shall be loaded using a multiple-drop method (front then back the middle) to minimize truck to truck segregation.

C. Paving Equipment – Asphalt pavers shall conform to WSDOT Standard Specifications Section 5-04.3(3)C.

D. Compaction Equipment – Rollers shall conform to WSDOT Standard Specifications Section 5-04.3(3)E.

E. Preparation of the Asphalt Binder Material (asphalt cement):

1. The binder shall be stored within the temperature range specified by the supplier of the binder for the grade of asphalt cement being used. Different grades of asphalt binder shall be stored separately and not mixed together at any time.

2. The binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the bituminous material to the mixer at a uniform temperature.
3. The temperature of the binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 350 degrees F unless otherwise required by the asphalt binder manufacturer.

F. Preparation of the Aggregates:

1. The aggregate for the mixture shall be heated and dried prior to introduction into the mixer. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates.
2. The aggregate temperature shall not be lower than is required to obtain complete coating and uniform distribution of the aggregate particles and to provide a mixture of satisfactory workability.

G. Preparation of Bituminous Mixture:

1. Mixing shall conform to WSDOT Standard Specifications Section 5-04.3(6), as modified herein.
2. The aggregates and the bituminous material shall be properly proportioned and introduced into the mixer in the amount specified by the job mix formula.
3. Job mix formula production tolerances shall conform to WSDOT Standard Specifications Section 9-03.8(7) (Statistical Evaluation), except the tolerance limits for aggregate shall not exceed the limits of the control points specified herein.
4. The moisture content of all bituminous mix upon discharge shall not exceed one (1) percent.

H. Preparation of the Underlying Surface:

1. Preparation shall conform to WSDOT Standard Specifications Sections 5-04.3(4), 5-04.3(4)A, and 5-04.3(5)C as modified herein.
2. Asphalt materials shall not be placed until the underlying course has been tested and accepted by the Engineer.
3. Immediately before placing asphalt materials, clean all underlying pavement surfaces and previous courses of all loose and foreign material by sweeping with hand brooms, power sweepers or blowers as directed by the Engineer.
4. Tack Coat:
    a. Tack coat shall be applied in accordance with WSDOT Standard Specifications Section 5-04.3(4)A, as modified herein. The Port inspector shall verify that the tack coat has been properly placed prior to constructing subsequent pavement lifts. Refer to the applicable sections in Chapter 5 of the WSDOT Construction Manual for guidance on tack coat application and inspection.
    b. Apply tack coat only when the underlying surface is dry, and the ambient temperature meets the requirements for the pavement course being placed.
    c. Residual asphalt coating shall be 0.03 to 0.05 gallons per square yard on newly placed asphalt surfaces

d. Residual asphalt coating shall be 0.06 to 0.08 gallons per square yard on existing or milled asphalt surfaces.

5. Manholes, valve boxes, inlets, and other appurtenances within the area to be paved shall be adjusted to grade as shown on the Contract Drawings. Permanent curbs, gutters, and other supports shall be constructed and backfilled prior to placing asphalt. All contact surfaces shall be coated with tack coat.

I. Transporting, Placing, and Finishing:

1. The asphalt concrete mixture shall be transported from the mixing plant to the site in vehicles conforming to the requirements specified herein.

2. Hauling over freshly placed material shall be not permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.

3. Placing and finishing of the asphalt mixture shall be in accordance with WSDOT Standard Specifications Section 5-04.3(7), as modified herein.

4. The nominal compacted depth of any layer of any course shall not exceed 4.0 inches.

5. The hot mix asphalt mixture shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than that specified below. The temperature requirements may be waived by the Engineer, if requested; however, all other requirements including compaction shall be met.

Lift Thickness, T (inches)	Minimum Base Temperature (degrees F)
T > 3	35
2 < T < 3	35
T < 2	45

6. The initial placement of the asphalt concrete mixture shall occur at a temperature suitable for obtaining density, surface smoothness, and other specified requirements but not less than 250 degrees F, unless approved by the Engineer.

7. Upon arrival, the mixture shall be placed to the full width of the paving lane. It shall be struck off in a uniform layer of such depth that, when the mix is properly compacted, shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the bituminous mat. Unless otherwise permitted, placement of the mixtures shall begin along the centerline of a crowned section or on the high side or areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 10-feet except where edge lanes require less width to complete the area.

8. Compaction of the asphalt mixture shall be in accordance with WSDOT Standard Specifications Section 5-04.3(10), as modified herein.

a. Each day’s production will be treated as a lot. A minimum of five sublots will be tested. Sublot sizes will not exceed 20 tons. Random test locations will be determined according to WSDOT Test Method T 716.

b. In-place density shall be a minimum of 93% of the reference theoretical maximum density as determined by WSDOT FOP for AASHTO T 209. Evidence of gauge calibration to cores, required in the test method, shall be provided for the approved job-mix being placed at a similar thickness or the gauge will be calibrated as described in the test method. Calibration cores may be omitted at the Engineer's discretion. At the Owner's discretion, cores can be used as the sole means of density acceptance with a testing frequency meeting the requirements of Section 8a.

c. Determine reference theoretical maximum density as the moving average of the most recent five determinations for the lot of asphalt concrete being placed according to WSDOT Materials Manual Standard Operating Procedure 729.

d. Engineer may evaluate cyclic density as described in WSDOT Standard Specifications Section 5-04.3(10)B to assess segregation.

9. Joints:

a. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 6-inches; however, the joint in the surface course shall be at the centerline of the pavement if that pavement is to be used by normal car or truck traffic.

b. Longitudinal joint density shall be assessed once per sublot in accordance with WSDOT SOP 735. Low density is defined as less than 91 percent of reference maximum density. When placing a single paver width patch, consecutive density tests will be taken on alternating sides of the patch.

c. Transverse joints in one course shall be offset by at least 10-feet longitudinally from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10-feet.

10. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and raked by hand tools.

3.02 JOINT SEALANT

A. Apply joint sealant to the edges of new paving joints, catch basins, manholes, at the meet lines to concrete structures and as directed by the Engineer.

3.03 SURFACE SMOOTHNESS

A. The completed surface of the wearing course shall conform to the smoothness tolerance requirements of WSDOT Standard Specifications Section 5-04.3(13).

END OF SECTION

Appendix 1: Structural Calculations

Port of Tacoma Maintenance
Back-up Generator

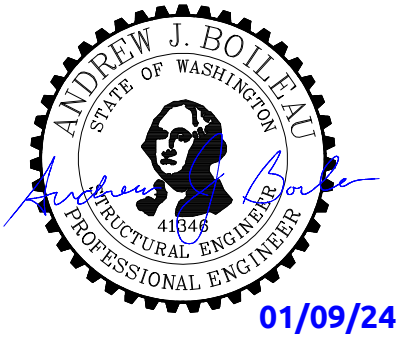
802 Port Center Road
Tacoma, WA 98421

CALCULATIONS

PREPARED FOR

Port of Tacoma

ONE SITCUM PLAZA
TACOMA, WA 98421



01/09/24

PREPARED BY

sitts&hill
4815 Center Street
Tacoma, WA 98409

January 9, 2024

S & H Job Number: 20,177

CALCULATION INDEX

BASIS FOR DESIGN

BUILDING CODE: 2018 Edition of the International Building Code with State of Washington and City of Tacoma amendments shall be used and supplemented with ASCE 7-16.

RISK CATEGORY: II.

GRAVITY LOADS:
Generator Weight = 17,696 lbf
CTS Weight = 520 lbf
Disconnect Weight = 432 lbf
ATS Weight = 500 lbf (assumed)

LATERAL LOAD CRITERIA:
Wind Speed = 97 mph, Exposure: D.
Seismic Site Class: D.
Seismic Design Category: D.

FOUNDATIONS:
Allowable soil bearing pressure = 2,000 psf.
Soil report supplied by Adams Hodsdon Bessette; W.O. 8950. Concrete footings shall bear on firm, undisturbed soil 18" minimum below finished grade.
Conservatively use code minimum bearing pressure of 1,500 psf.

CONCRETE: Minimum compressive strength of concrete shall be 3,000 psi.

REINFORCING: All bars shall be ASTM A615, Grade 60, unless noted otherwise.

STRUCTURAL STEEL:

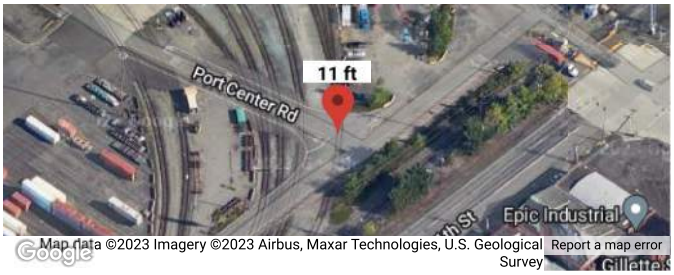
Wide Flange Steel	ASTM A992, Grade 50	50 ksi
Hollow Square or Rectangular Steel	ASTM A500, Grade B	46 ksi
Hollow Round Steel	ASTM A500, Grade B	42 ksi
Pipe Steel	ASTM A53, Type E or S, Grade B	35 ksi
All Other Structural Steel Shapes	ASTM A36	36 ksi

Anchor Bolts: ASTM F1554, Grade 55.

Hazards by Location

Search Information

Address:	802 Port Center Rd, Tacoma, WA 98421, USA
Coordinates:	47.2683915, -122.4078551
Elevation:	11 ft
Timestamp:	2023-09-28T20:03:55.823Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D-default



Basic Parameters

Name	Value	Description
S_S	1.347	MCE_R ground motion (period=0.2s)
S_1	0.464	MCE_R ground motion (period=1.0s)
S_{MS}	1.617	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value $S_{M1} = 1.5F_vS_1 = 1.28$
S_{DS}	1.078	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA $S_{D1} = 2/3S_{M1} = 0.853$

* See Section 11.4.8

USING EXCEPTION 1 PER ASCE 7-16 SECTION 11.4.8, A SITE-SPECIFIC GROUNG MOTION PROCEDURE IS NOT REQUIRED.

Additional Information

Name	Value	Description
SDC	* null **D**	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s $F_v = 1.835$ **PER TABLE 11.4-2**
CR_S	0.912	Coefficient of risk (0.2s)
CR_1	0.898	Coefficient of risk (1.0s)
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.347	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.478	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.464	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.517	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Hazards by Location

Search Information

Address:	802 Port Center Rd, Tacoma, WA 98421, USA
Coordinates:	47.2683915, -122.4078551
Elevation:	11 ft
Timestamp:	2023-09-28T20:01:22.932Z
Hazard Type:	Wind

ASCE 7-16

MRI 10-Year	67 mph
MRI 25-Year	73 mph
MRI 50-Year	78 mph
MRI 100-Year	82 mph
Risk Category I	92 mph
Risk Category II	97 mph
Risk Category III	104 mph
Risk Category IV	108 mph

ASCE 7-10

MRI 10-Year	72 mph
MRI 25-Year	79 mph
MRI 50-Year	85 mph
MRI 100-Year	91 mph
Risk Category I	100 mph
Risk Category II	110 mph
Risk Category III-IV	115 mph

ASCE 7-05

ASCE 7-05 Wind Speed	85 mph

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are interpolated from data provided in ASCE 7 and rounded up to the nearest whole integer. Per ASCE 7, islands and coastal areas outside the last contour should use the last wind speed contour of the coastal area – in some cases, this website will extrapolate past the last wind speed contour and therefore, provide a wind speed that is slightly higher. NOTE: For queries near wind-borne debris region boundaries, the resulting determination is sensitive to rounding which may affect whether or not it is considered to be within a wind-borne debris region.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

While the information presented on this website is believed to be correct, ATC and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in the report should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. ATC does not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-145369	A	1	PRODUCTION_RELEASE	AM	KK	K_KISHORE	05AUG14

TABULATION												
TANK/LIFT BASE FEATURE CODE	TANK CAPACITY	TANK WEIGHT DRY KG (LBS)	DIM_D	DIM_E	DIM_F	DIM_G DFEJ, DFEK	DIM_G DQHAB	DIM_G DQDAA, DQDAB, DQDAC	DIM_H	DIM_J	DIM_K	DIM_L
C242	270	939 (2071)	2643 (104)	183 (7.2)	305 (12)	1625.6 (64.0)	1447.6 (57.0)	1371.8 (54.0)	526 (20.7)	1126 (44.3)	1122 (44.2)	614.7 (24.2)
C201	300	954 (2103)	2643 (104)	183 (7.2)	305 (12)	1625.6 (64.0)	1447.6 (57.0)	1371.8 (54.0)	526 (20.7)	1126 (44.3)	1122 (44.2)	614.7 (24.2)
C202	400	1019 (2246)	2694 (106)	234 (9.2)	356 (14)	1676.6 (66.0)	1498.6 (59.0)	1422.8 (56.0)	577 (22.7)	1177 (46.3)	1173 (46.2)	665 (26.2)
C203	500	1097 (2419)	2749.6 (108.2)	291 (11.5)	413 (16.2)	1733.2 (68.2)	1555.2 (61.2)	1479.4 (58.2)	633.6 (24.9)	1234.6 (48.5)	1230.6 (48.4)	722.9 (28.4)
C204	600	1161 (2559)	2819 (111)	361 (14.2)	483 (19)	1803.6 (71.0)	1625.6 (64.0)	1549.8 (61.0)	704 (27.7)	1304 (51.3)	1300 (51.2)	792.5 (31.2)
C205	660	1198 (2641)	2864.3 (112.7)	405 (15.9)	527 (20.7)	1847.9 (72.7)	1669.9 (65.7)	1594.1 (62.7)	748.3 (29.4)	1349.3 (53.0)	1345.3 (52.9)	836.9 (32.9)
C206	720	1243 (2741)	2908.2 (114.5)	450 (17.7)	572 (22.5)	NA	NA	1639 (64.2)	793.2 (31.2)	1394.2 (54.8)	1390.2 (54.7)	881.9 (34.7)
C207	850	1332 (2936)	2997 (118)	538 (21.2)	660 (26)	1980.6 (78.0)	1802.6 (71.0)	NA	881 (34.7)	1481 (58.3)	1478 (58.2)	970.3 (38.2)
F214	NA	NA	2540 (100)	81 (3.2)	203 (8)	1523.6 (60.0)	1345.6 (53.0)	1371.8 (50.0)	424 (16.7)	1024 (40.3)	1021 (40.2)	513.1 (20.2)

TABULATION						
MODEL	KW	CG_DIM "A"	CG_DIM "B"	CG_DIM "C"	STEEL ENCLOSURE WEIGHT KG (LBS)	ALUMINUM ENCLOSURE WEIGHT KG (LBS)
DFEJ	450	1956 [77.0]	1041 [41]	737 [29.0]	8026 (17696)	7536 (16606)
DFEK	500	1933 [76.1]			8162 (17996)	7672 (16906)
DQDAA	250	1927 [75.9]		723 [28.5]	5957 (13088)	5467 (11998)
DQDAB	275					
DQDAC	300	1945 [76.6]		724 [28.5]	6057 (13388)	5567 (12298)
DQHAB	300	2085 [82.1]		871 [34.3]	6384 (14076)	5894 (12986)

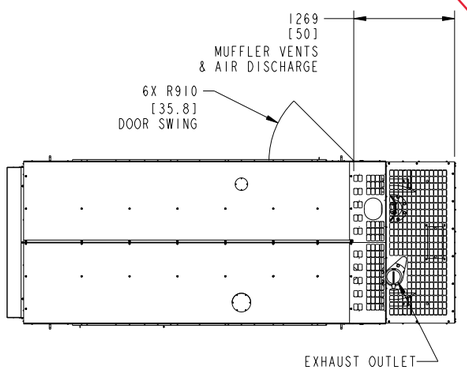
***WEIGHT & CG'S ARE SHOWN WITH HIGHEST GALLON FUEL TANK, ENCLOSURE, AND STANDARD WET GENSET. ADDITION OF OTHER FEATURES MAY CHANGE THE WEIGHT.

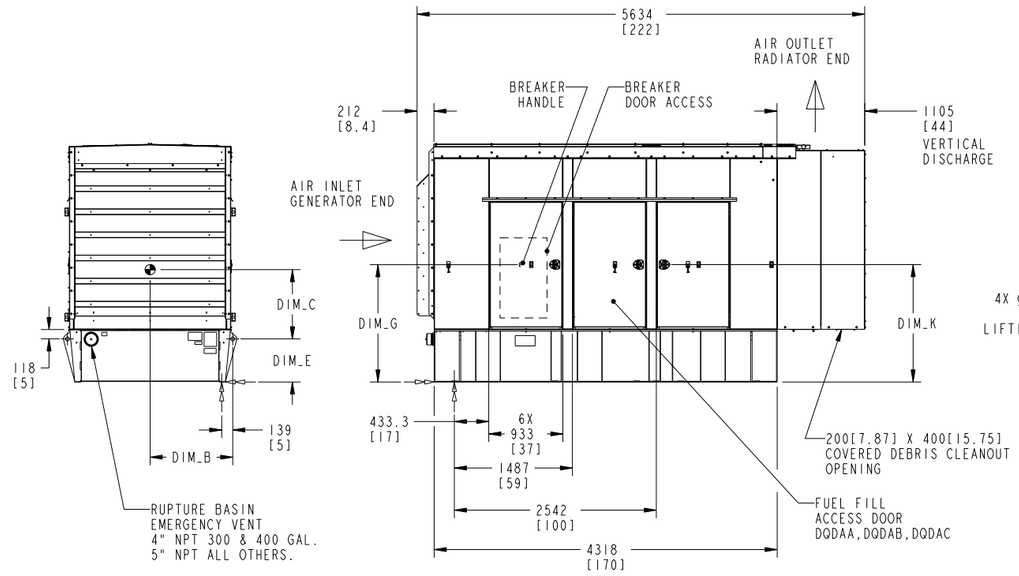
use this page

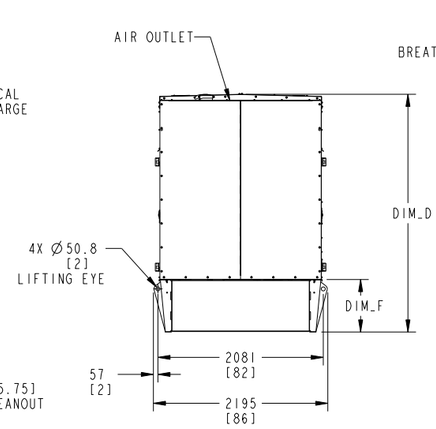
NOTES:

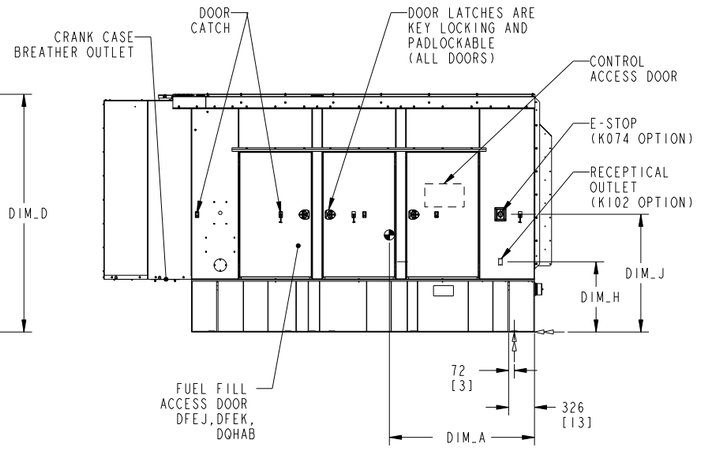
1. DIMENSIONS SHOWN IN [ ] ARE INCHES.
2. FOUNDATION REFERENCE POINT (⟜). SEE FOUNDATION DRAWING FOR DETAILS.
3. FOR FEATURE CODE L116 (FLORIDA TANKS) AND L120 (MICHIGAN TANKS) ADD 162MM [6.4"] TO DIMS D-L
4. SEE SHEET 2 FOR TANK VENT LOCATIONS.
5. EXCESSIVE TWISTING OF THE FUEL TANK, WHEN FASTENING IT TO A FOUNDATION, MAY RESULT IN STRUCTURAL FAILURE OF THE TANK. TO INSURE THE INSTALLATION DOES NOT EXCESSIVELY TWIST THE FUEL TANK, THE FOLLOWING PROCEDURE MUST BE OBSERVED:
   - 5.1 REFER TO CUMMINS APPLICATION MANUAL T030 FOR GENERAL GENSET/TANK MOUNTING GUIDELINES.
   - 5.2 TIGHTEN TANK HOLD DOWN MOUNTING FASTENERS.
6. ALL DIMENSIONS NOT SHOWN ARE IDENTICAL TO THOSE SHOWN ON SHEET 1.
7. THE ENCLOSURE IS ENGINEERED TO MAINTAIN IT'S INTEGRITY WITH A 150 MPH WIND LOAD CONDITION.

OPTIONAL FEATURE
F202,F205









UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SIM TO A034J589	DRN A_MARBHAL		CUMMINS POWER GENERATION	
DIM: X ±1, .X ±0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD K_KISHORE	SITE CODE PGF	OUTLINE, ENCLOSURE (LEVEL 2)	
ANG TOL: ± 1.0°	SCALE: 1/32	APVD K_KISHORE		SIZE D	A050L370 SHEET 1 OF 4 REV A
	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	DATE 05AUG14	FIRST USED ON DFEJ,K		
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994			

GENERATOR ANALYSIS

DESIGN DATA:

$L := 222\ in = 18.50\ ft$ GENERATOR LENGTH

$B := 82\ in = 6.83\ ft$ GENERATOR DEPTH

$H_t := 118\ in = 9.83\ ft$ GENERTOR HEIGHT

$H_{cg} := 21.2\ in + 29\ in = 4.18\ ft$ CENTER OF GRAVITY HEIGHT

$W_{tot} := 2936\ lbf + 17696\ lbf = 20632\ lbf$ TOTAL WEIGHT

USE:

$W_{tot} := 21000\ lbf$

SEISMIC ANALYSIS:

AS PER SECTION 1613.1 OF THE 2018 EDITION OF THE INTERNATIONAL BUILDING CODE (IBC), SEISMIC FORCES SHALL BE DETERMINED IN ACCORDANCE WITH THE PROVISIONS OF ASCE 7-16. SECTION 13.3 SHALL BE USED TO DETERMINE THE SEISMIC DESIGN FORCE.

THE SEISMIC LOAD EFFECT "*E*" FOR USE IN THE BASIC LOAD COMBINATIONS OF SECTION 2.3 AND 2.4 OF ASCE 7-16 SHALL BE DETERMINED IN ACCORDANCE WITH SECTION 13.3 OF ASCE 7-16.

SEISMIC COEFFICIENTS DETERMINED USING SECTION 13.3.1 AND TABLE 13.6-1 OF ASCE 7-16 FOR MECHANICAL AND ELECTRICAL COMPONENTS

$a_p := 1$ COMPONENT AMPLIFICATION FACTOR PER TABLE 13.6-1

$R_p := 2.5$ COMPONENT RESPONSE MODIFICATION COEFFICIENT PER TABLE 13.6-1

$\Omega_0 := 2$ OVERSTRENGTH FACTOR, TABLE 13.6-1

$S_{DS} := 1.078$ DESIGN SPECTRAL RESPONSE ACCELERATION AT SHORT PERIODS

$S_{D1} := 0.853$ DESIGN SPECTRAL RESPONSE ACCELERATION AT ONE SECOND PERIOD

$I_p := 1.0$ OCCUPANCY IMPORTANCE FACTOR, TABLE 11.5-1

$h_n := H_t = 10\ ft$ HEIGHT IN FEET ABOVE THE BASE TO THE HIGHEST LEVEL OF THE STRUCTURE

D SEISMIC DESIGN CATEGORY

W SEISMIC WEIGHT OF STRUCTURE

$z := 0\ ft$ HEIGHT OF ATTACHMENT POINT

$$F_{pnom} := \frac{0.4 \cdot a_p \cdot S_{DS} \cdot W_{tot}}{\frac{R_p}{I_p}} \cdot \left(1 + 2 \cdot \frac{z}{H_t}\right) = 3622\ lbf$$ EQ. 13.3-1

$$F_{pmax} := 1.6 \cdot S_{DS} \cdot I_p \cdot W_{tot} = 36221\ lbf$$ EQ. 13.3-2

$$F_{pmin} := 0.3 \cdot S_{DS} \cdot I_p \cdot W_{tot} = 6791\ lbf$$ EQ. 13.3-3

$$F_p := min\left(F_{pmax}, \max\left(F_{pnom}, F_{pmin}\right)\right) = 6791\ lbf$$

DETERMINE THE SEISMIC FORCE APPLIED TO THE GENERATOR:

$V_E := F_p = 6.79\ \textbf{\textit{kip}}$ Total seismic shear

$M_E := V_E \cdot H_{cg} = 28.41\ \textbf{\textit{kip}} \cdot \textbf{\textit{ft}}$ Seismic overturning moment

WIND ANALYSIS:

DETERMINE THE WIND LOAD LOAD ON THE GENERATOR PER ASCE 7-16 CHAPER 26 AND CHAPTER 29.

II	RISK CATEGORY, TABLE 1.5-1
$V := 97$	BASIC WIND SPEED (MPH), SECTION 26.5
D	EXPOSURE CATEGORY, SECTION 26.7
$K_d := 0.9$	WIND DIRECTIONALITY FACTOR, TABLE 26.6-1 (SQUARE TANKS)
$K_{zt} := 1.0$	TOPOGRAPHIC FACTOR, SECTION 26.8.2
K_z	VELOCITY PRESSURE EXPOSURE COEFFICIENT, TABLE 26.10-1
$K_e := 1.0$	GROUND ELEVATION FACTOR, SECTION 26.9
$G := 0.85$	GUST FACTOR, SECTION 26.11
$\alpha := 11.5$	TERRAIN EXPOSURE CONSTANTS, TABLE 26.11-1 (EXPOSURE D)
$z_g := 700$	TERRAIN EXPOSURE CONSTANTS, TABLE 26.11-1 (EXPOSURE D)
q_z	VELOCITY PRESSURE AT HEIGHT z, EQ. 26.10-1

DETERMINE THE MAXIMUM VELOCITY PRESSURE AT THE TANK CENTER OF GRAVITY

$z := 10$ ft. HEIGHT OF GENERATOR

$$K_z := 2.01 \cdot \left(\frac{15}{z_g}\right)^{\frac{2}{\alpha}} = 1.03$$

$q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 \cdot psf = 22\ psf$ VELOCITY PRESSURE

DETERMINE THE FORCE COEFFICIENT PER SECTION 29.4.2.1

$H_t = 9.83\ ft$ $D := min(L, B) = 6.83\ ft$

$\frac{H_t}{D} = 1.44$

$C_f := 1.307$ FIGURE 29.4-1

DETERMINE THE WIND PRESSURE PER SECTION 29.5

$p_C := q_z \cdot G \cdot C_f = 25\ psf$

DETERMINE THE WIND LOAD ON THE GENERATOR:

$A := H_t \cdot \max(L, B) = 182\ ft^2$

$F_{wind} := p_C \cdot A = 4514\ lbf$

$V_W := F_{wind} = 4514\ lbf$ Total wind shear

$M_W := F_{wind} \cdot H_{cg} = 18.88\ kip \cdot ft$ Total wind overturning

SEISMIC LOAD CONTROLS

Project: Generator Foundation

FOUNDATION ANALYSIS:

$P_D := W_{tot} = 21\ kip$ DEAD LOAD

$V_E = 6.79\ kip$ SEISMIC SHEAR LOAD

$H_{cg} = 4\ ft$

$M_E = 28.41\ kip \cdot ft$ SEISMIC MOMENT

USE A 19'-6"x7'-0"x24" DEEP FOOTING MIN.
WITH #5 AT 12" O.C. E.W. TOP AND BOTTOM

General Footing

Project File: 20177.ec6

DESCRIPTION: Generator Pad

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.02	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00090
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Footing base depth below soil surface	=	1.50	ft
Allow press. increase per foot of depth	=		ksf
when footing base is below	=		ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=		ksf
when max. length or width is greater than	=		ft

Dimensions

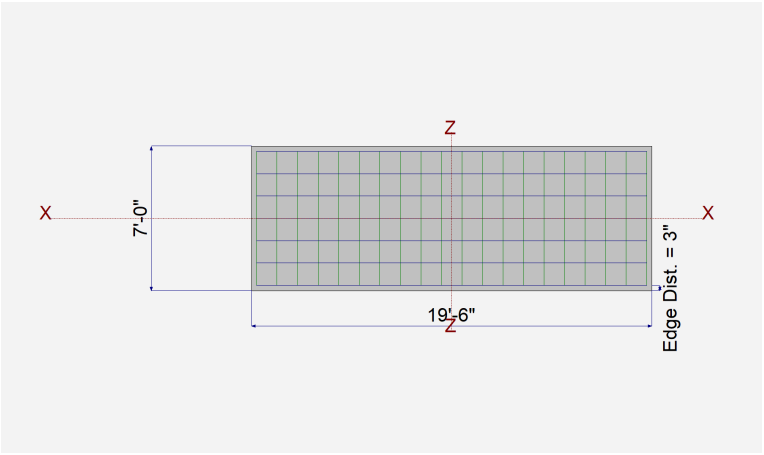
Width parallel to X-X Axis	=	19.50	ft
Length parallel to Z-Z Axis	=	7.0	ft
Footing Thickness	=	24.0	in

Pedestal dimensions...

px : parallel to X-X Axis	=		in
pz : parallel to Z-Z Axis	=		in
Height	=		in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0	in



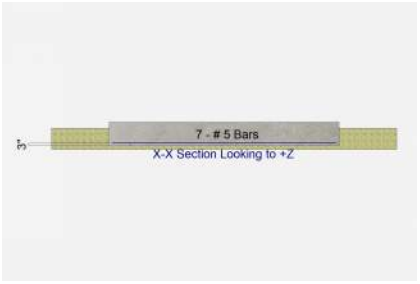
Reinforcing

Bars parallel to X-X Axis			
Number of Bars	=		7.0
Reinforcing Bar Size	=	#	5
Bars parallel to Z-Z Axis			
Number of Bars	=		20.0
Reinforcing Bar Size	=	#	5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	Bars along Z-Z Axis
# Bars required within zone	52.8 %
# Bars required on each side of zone	47.2 %



Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	21.0							k
OB : Overburden	=								ksf
M-xx	=					18.880	28.410		k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=					4.514	6.790		k

General Footing

Project File: 20177.ec6

DESCRIPTION: Generator Pad

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.4177	Soil Bearing	0.6266 ksf	1.50 ksf	+D-0.70E about X-X axis
PASS	4.329	Overturning - X-X	29.393 k-ft	127.229 k-ft	+0.60D+0.70E
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	3.448	Sliding - Z-Z	4.753 k	16.390 k	+0.60D+0.70E
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3546	Z Flexure (+X)	10.238 k-ft/ft	28.871 k-ft/ft	+1.40D
PASS	0.3546	Z Flexure (-X)	10.238 k-ft/ft	28.871 k-ft/ft	+1.40D
PASS	0.05816	X Flexure (+Z)	1.721 k-ft/ft	29.60 k-ft/ft	+0.6844D+E
PASS	0.05816	X Flexure (-Z)	1.721 k-ft/ft	29.60 k-ft/ft	+0.6844D-E
PASS	0.08317	1-way Shear (+X)	6.833 psi	82.158 psi	+1.40D
PASS	0.08317	1-way Shear (-X)	6.833 psi	82.158 psi	+1.40D
PASS	0.02562	1-way Shear (+Z)	2.105 psi	82.158 psi	+0.6844D+E
PASS	0.02562	1-way Shear (-Z)	2.105 psi	82.158 psi	+0.6844D-E
PASS	0.09948	2-way Punching	16.347 psi	164.317 psi	+1.40D

Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.50	n/a	0.0	0.4438	0.4438	n/a	n/a	0.296
X-X, +D+0.60W	1.50	n/a	3.317	0.3398	0.5479	n/a	n/a	0.365
X-X, +D-0.60W	1.50	n/a	-3.317	0.5479	0.3398	n/a	n/a	0.365
X-X, +D+0.70E	1.50	n/a	5.822	0.2611	0.6266	n/a	n/a	0.418
X-X, +D-0.70E	1.50	n/a	-5.822	0.6266	0.2611	n/a	n/a	0.418
X-X, +0.60D+0.60W	1.50	n/a	5.528	0.1622	0.3704	n/a	n/a	0.247
X-X, +0.60D-0.60W	1.50	n/a	-5.528	0.3704	0.1622	n/a	n/a	0.247
X-X, +0.60D+0.70E	1.50	n/a	9.703	0.08358	0.4490	n/a	n/a	0.299
X-X, +0.60D-0.70E	1.50	n/a	-9.703	0.4490	0.08358	n/a	n/a	0.299
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.4438	0.4438	0.296
Z-Z, +D+0.60W	1.50	0.0	n/a	n/a	n/a	0.4438	0.4438	0.296
Z-Z, +D-0.60W	1.50	0.0	n/a	n/a	n/a	0.4438	0.4438	0.296
Z-Z, +D+0.70E	1.50	0.0	n/a	n/a	n/a	0.4438	0.4438	0.296
Z-Z, +D-0.70E	1.50	0.0	n/a	n/a	n/a	0.4438	0.4438	0.296
Z-Z, +0.60D+0.60W	1.50	0.0	n/a	n/a	n/a	0.2663	0.2663	0.178
Z-Z, +0.60D-0.60W	1.50	0.0	n/a	n/a	n/a	0.2663	0.2663	0.178
Z-Z, +0.60D+0.70E	1.50	0.0	n/a	n/a	n/a	0.2663	0.2663	0.178
Z-Z, +0.60D-0.70E	1.50	0.0	n/a	n/a	n/a	0.2663	0.2663	0.178

ANCHORAGE DESIGN:

LC: (0.9-0.2Sds)D+Ω_0 E

$D2 := 82\ in - 10\ in = 6.0\ ft$ Distance between anchors

$n := 4$ Assumed Number of Anchors

$P := \left(0.9 - 0.2\ S_{DS}\right) \cdot \frac{W_{tot}}{n} - \frac{\Omega_0 \cdot M_E}{D2 \cdot 2} = -1142\ lbf$ Maximum uplift at anchor location

$V_x := \frac{\Omega_0 \cdot V_E}{n} = 3395.7\ lbf$ Maximum shear at anchor location

USE 1/2" DIAMETER ANCHORS
MIN. - (4) TOTAL MIN.

Hilti PROFIS Engineering 3.0.88

www.hilti.com

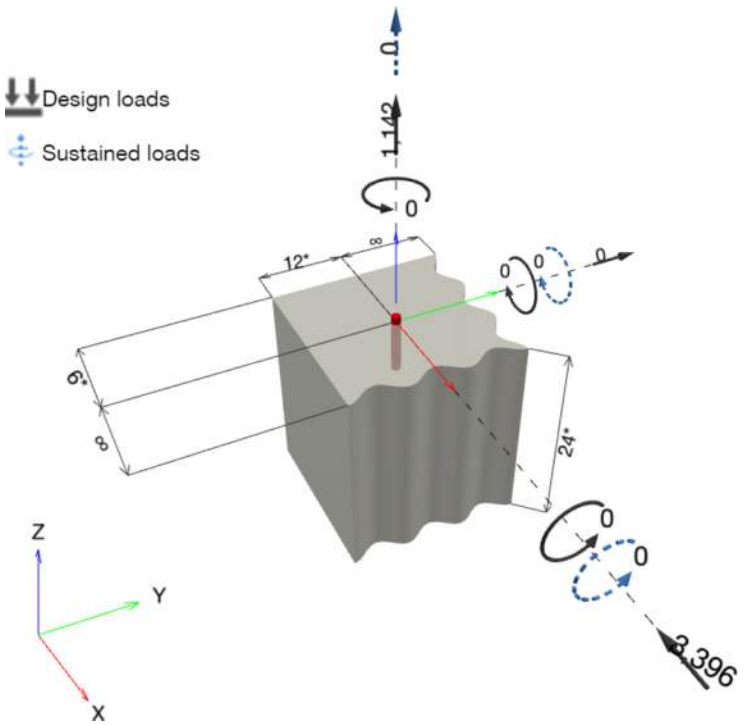
Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

Specifier's comments:

1 Input data

Anchor type and diameter:	**HIT-HY 200 V3 + HAS-E-55 (ASTM F1554 Gr.55) 1/2**
Item number:	2197990 HAS-E-55 1/2"x4-1/2" (element) / 2334276 HIT-HY 200-R V3 (adhesive)
Effective embedment depth:	$h_{ef,opti}$ = 2.829 in. ($h_{ef,limit}$ = 10.000 in.)
Material:	ASTM F1554 Grade 55
Evaluation Service Report:	ESR-4868
Issued I Valid:	11/1/2022 | 11/1/2024
Proof:	Design Method ACI 318-14 / Chem
Stand-off installation:	
Profile:	
Base material:	cracked concrete, 3000, f_c' = 3,000 psi; h = 24.000 in., Temp. short/long: 32/32 °F
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar

Geometry [in.] & Loading [lb, in.lb]



Hilti PROFIS Engineering 3.0.88

www.hilti.com

Company:		Page:	2
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 1,142; V_x = -3,396; V_y = 0; M_x = 0; M_y = 0; M_z = 0; N_{sus} = 0; $M_{x,sus}$ = 0; $M_{y,sus}$ = 0;	no	100

2 Load case/Resulting anchor forces

Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	1,142	3,396	-3,396	0

max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [psi]
resulting tension force in (x/y)=(0.000/0.000): 0 [lb]
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	1,142	7,984	15	OK
Bond Strength**	1,142	2,926	40	OK
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	1,142	2,879	40	OK

* highest loaded anchor **anchor group (anchors in tension)

Hilti PROFIS Engineering 3.0.88

www.hilti.com

Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

3.1 Steel Strength

N_{sa} = ESR value	refer to ICC-ES ESR-4868
$\phi\ N_{sa} \geq N_{ua}$	ACI 318-14 Table 17.3.1.1

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.14	75,000

Calculations

N_{sa} [lb]
10,645

Results

N_{sa} [lb]	ϕ_{steel}	$\phi\ N_{sa}$ [lb]	N_{ua} [lb]
10,645	0.750	7,984	1,142

Company:		Page:	4
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

3.2 Bond Strength

$N_a = \left(\frac{A_{Na}}{A_{Na0}}\right) \psi_{ed,Na} \psi_{cp,Na} N_{ba}$ ACI 318-14 Eq. (17.4.5.1a)

$\phi N_a \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Na} see ACI 318-14, Section 17.4.5.1, Fig. R 17.4.5.1(b)

$A_{Na0} = (2 c_{Na})^2$ ACI 318-14 Eq. (17.4.5.1c)

$c_{Na} = 10 d_a \sqrt{\frac{\tau_{uncr}}{1100}}$ ACI 318-14 Eq. (17.4.5.1d)

$\psi_{ed,Na} = 0.7 + 0.3 \left(\frac{c_{a,min}}{c_{Na}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.5.4b)

$\psi_{cp,Na} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.5.5b)

$N_{ba} = \lambda_a \cdot \tau_{k,c} \cdot \pi \cdot d_a \cdot h_{ef}$ ACI 318-14 Eq. (17.4.5.2)

Variables

$\tau_{k,c,uncr}$ [psi]	d_a [in.]	h_{ef} [in.]	$c_{a,min}$ [in.]	$\alpha_{overhead}$	$\tau_{k,c}$ [psi]
2,261	0.500	2.829	6.000	1.000	1,156

c_{ac} [in.]	λ_a
4.279	1.000

Calculations

c_{Na} [in.]	A_{Na} [in.^{2}]	A_{Na0} [in.^{2}]	$\psi_{ed,Na}$
7.136	187.47	203.68	0.952

$\psi_{cp,Na}$	N_{ba} [lb]
1.000	5,136

Results

N_a [lb]	ϕ_{bond}	ϕN_a [lb]	N_{ua} [lb]
4,502	0.650	2,926	1,142

Company:		Page:	5
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

3.3 Concrete Breakout Failure

$N_{cb} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ ACI 318-14 Eq. (17.4.2.1a)

$\phi N_{cb} \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Nc} see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-14 Eq. (17.4.2.1c)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.5b)

$\psi_{cp,N} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.7b)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ ACI 318-14 Eq. (17.4.2.2a)

Variables

h_{ef} [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
2.829	6.000	1.000	4.279	17	1.000	3,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
72.02	72.02	1.000	1.000	4,430

Results

N_{cb} [lb]	$\phi_{concrete}$	ϕN_{cb} [lb]	N_{ua} [lb]
4,430	0.650	2,879	1,142

Hilti PROFIS Engineering 3.0.88

www.hilti.com

Company:		Page:	6
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	3,396	4,150	82	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Concrete Breakout Strength controls)**	3,396	6,202	55	OK
Concrete edge failure in direction x-**	3,396	3,945	87	OK

* highest loaded anchor **anchor group (relevant anchors)

4.1 Steel Strength

V_{sa} = ESR value refer to ICC-ES ESR-4868
ϕ $V_{steel} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]
0.14	75,000

Calculations

V_{sa} [lb]
6,385

Results

V_{sa} [lb]	ϕ steel	ϕ V_{sa} [lb]	V_{ua} [lb]
6,385	0.650	4,150	3,396

4.2 Pryout Strength (Concrete Breakout Strength controls)

$V_{cp} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right]$ ACI 318-14 Eq. (17.5.3.1a)

$\phi V_{cp} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Nc} see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-14 Eq. (17.4.2.1c)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.5b)

$\psi_{cp,N} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.7b)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ ACI 318-14 Eq. (17.4.2.2a)

Variables

k_{cp}	h_{ef} [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
2	2.829	6.000	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
4.279	17	1.000	3,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
72.02	72.02	1.000	1.000	4,430

Results

V_{cp} [lb]	$\phi_{concrete}$	ϕV_{cp} [lb]	V_{ua} [lb]
8,860	0.700	6,202	3,396

Company:		Page:	8
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

4.3 Concrete edge failure in direction x-

$V_{cb} = \left(\frac{A_{Vc}}{A_{Vc0}}\right) \psi_{ed,V} \psi_{c,V} \psi_{h,V} \psi_{parallel,V} V_b$ — ACI 318-14 Eq. (17.5.2.1a)

$\phi V_{cb} \geq V_{ua}$ — ACI 318-14 Table 17.3.1.1

A_{Vc} see ACI 318-14, Section 17.5.2.1, Fig. R 17.5.2.1(b)

$A_{Vc0} = 4.5 c_{a1}^2$ — ACI 318-14 Eq. (17.5.2.1c)

$\psi_{ed,V} = 0.7 + 0.3\left(\frac{c_{a2}}{1.5c_{a1}}\right) \leq 1.0$ — ACI 318-14 Eq. (17.5.2.6b)

$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0$ — ACI 318-14 Eq. (17.5.2.8)

$V_b = \left(7\left(\frac{l_e}{d_a}\right)^{0.2}\sqrt{d_a}\right) \lambda_a \sqrt{f'_c}\, c_{a1}^{1.5}$ — ACI 318-14 Eq. (17.5.2.2a)

Variables

c_{a1} [in.]	c_{a2} [in.]	$\psi_{c,V}$	h_a [in.]	l_e [in.]
6.000	12.000	1.000	24.000	2.829

λ_a	d_a [in.]	f'_c [psi]	$\psi_{parallel,V}$
1.000	0.500	3,000	1.000

Calculations

A_{Vc} [in.^{2}]	A_{Vc0} [in.^{2}]	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [lb]
162.00	162.00	1.000	1.000	5,635

Results

V_{cb} [lb]	$\phi_{concrete}$	ϕV_{cb} [lb]	V_{ua} [lb]
5,635	0.700	3,945	3,396

5 Combined tension and shear loads

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.397	0.861	5/3	100	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

Company:		Page:	9
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Design Strengths of adhesive anchor systems are influenced by the cleaning method. Refer to the INSTRUCTIONS FOR USE given in the Evaluation Service Report for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. Reference ACI 318-14, Section 17.8.1.

Fastening meets the design criteria!

Company:		Page:	10
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

7 Installation data

Anchor type and diameter: HIT-HY 200 V3 + HAS-E-55 (ASTM F1554 Gr.55) 1/2

Profile: -

Item number: 2197990 HAS-E-55 1/2"x4-1/2" (element) / 2334276 HIT-HY 200-R V3 (adhesive)

Hole diameter in the fixture: -

Maximum installation torque: 360 in.lb

Plate thickness (input): -

Hole diameter in the base material: 0.562 in.

Hole depth in the base material: 2.829 in.

Drilling method: Hammer drilled

Minimum thickness of the base material: 4.079 in.

Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

1/2 Hilti HAS Carbon steel threaded rod with Hilti HIT-HY 200 V3 Safe Set System

7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• Compressed air with required accessories to blow from the bottom of the hole • Proper diameter wire brush	• Dispenser including cassette and mixer • Torque wrench

Coordinates Anchor in.

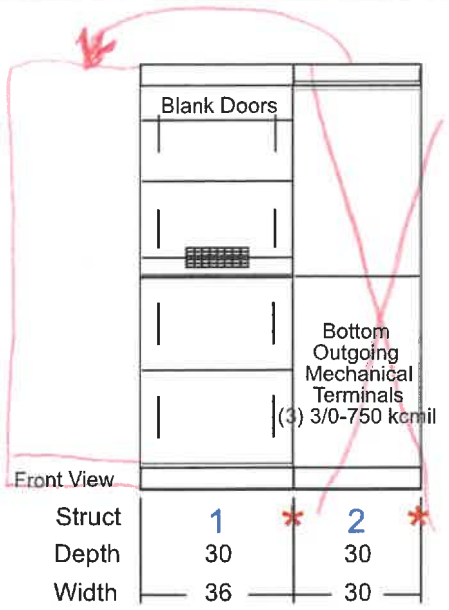
Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0.000	0.000	6.000	-	12.000	-

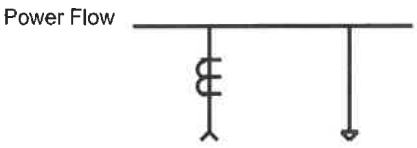
Company:		Page:	11
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Concrete - Sep 28, 2023	Date:	10/5/2023
Fastening point:			

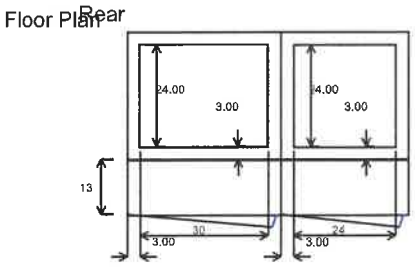
8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

OUR DESIGN IS SWAPPED







Total of 2 Structures, Total Weight of 952 Weight-Lbs. with Front Hinged Doors.
Total of 2 Structures, Total Width of 66 Inches with Front Hinged Doors.

Structure	1	2				
Ship-Inches	36.00	30.00				
Ship-MM	914	762				
Wdth-Inches	36.00	30.00				
Wdth-MM	914	762				
Depth(Inner)-In.	30.00	30.00				
Depth(Inner)-MM	762	762				
Depth(Outer)-In.	43.00	43.00				
Depth(Outer)-MM	1092	1092				
Height-Inches	90.00	90.00				
Height-MM	2286	2286				
Weight-Lbs.(Est.)	520	432				
Weight-Kg.(Est.)	235	195				

PREPARED BY	DATE		
Brent Hughes	11/20/2023	Eaton	SumterSC
APPROVED BY	DATE	JOB NAME	Port of Tacoma, 800 amp EUSERC Service Entrance Rated
		DESIGNATION	800A CT Compartment
VERSION		TYPE	DRAWING TYPE
9.0.33.3		Switchboards	CustAppr

NEG-ALT Number	REVISION	DWG SIZE	G.O.	ITEM	SHEET
SWPF1009X3K1-0002	0	DwgA			2 of 3

ELECTRICAL EQUIPMENT ANALYSIS

DESIGN DATA:

CTS:

$L_{CTS} := 36\ in = 3.00\ ft$ LENGTH

$B_{CTS} := 24\ in = 2\ ft$ DEPTH

$H_{tCTS} := 90\ in = 7.50\ ft$ HEIGHT

$H_{cgCTS} := \frac{H_{tCTS}}{2} = 3.75\ ft$ CENTER OF GRAVITY HEIGHT

$W_{CTS} := 520\ lbf$ WEIGHT

DISCONNECT

$L_D := 30\ in = 2.50\ ft$ LENGTH

$B_D := 24\ in = 2\ ft$ DEPTH

$H_{tD} := 90\ in = 7.50\ ft$ HEIGHT

$H_{cgD} := \frac{H_{tD}}{2} = 3.75\ ft$ CENTER OF GRAVITY HEIGHT

$W_D := 432\ lbf$ WEIGHT

ATS

$L_{ATS} := 39\ in = 3.25\ ft$ LENGTH

$B_{ATS} := 26\ in = 2.17\ ft$ DEPTH

$H_{tATS} := 90\ in = 7.50\ ft$ HEIGHT

$H_{cgATS} := \frac{H_{tATS}}{2} = 3.75\ ft$ CENTER OF GRAVITY HEIGHT

$W_{ATS} := 500\ lbf$ WEIGHT (ASSUMED)

SEISMIC ANALYSIS:

AS PER SECTION 1613.1 OF THE 2018 EDITION OF THE INTERNATIONAL BUILDING CODE (IBC), SEISMIC FORCES SHALL BE DETERMINED IN ACCORDANCE WITH THE PROVISIONS OF ASCE 7-16. SECTION 13.3 SHALL BE USED TO DETERMINE THE SEISMIC DESIGN FORCE.

THE SEISMIC LOAD EFFECT "*E*" FOR USE IN THE BASIC LOAD COMBINATIONS OF SECTION 2.3 AND 2.4 OF ASCE 7-16 SHALL BE DETERMINED IN ACCORDANCE WITH SECTION 13.3 OF ASCE 7-16.

SEISMIC COEFFICIENTS DETERMINED USING SECTION 13.3.1 AND TABLE 13.6-1 OF ASCE 7-16 FOR MECHANICAL AND ELECTRICAL COMPONENTS

$a_p := 1$ COMPONENT AMPLIFICATION FACTOR PER TABLE 13.6-1

$R_p := 2.5$ COMPONENT RESPONSE MODIFICATION COEFFICIENT PER TABLE 13.6-1

$\Omega_0 := 2$ OVERSTRENGTH FACTOR, TABLE 13.6-1

$S_{DS} := 1.078$ DESIGN SPECTRAL RESPONSE ACCELERATION AT SHORT PERIODS

$S_{D1} := 0.853$ DESIGN SPECTRAL RESPONSE ACCELERATION AT ONE SECOND PERIOD

$I_p := 1.0$ OCCUPANCY IMPORTANCE FACTOR, TABLE 11.5-1

$h_n := H_{tATS} = 8\ ft$ HEIGHT IN FEET ABOVE THE BASE TO THE HIGHEST LEVEL OF THE STRUCTURE

D SEISMIC DESIGN CATEGORY

W SEISMIC WEIGHT OF STRUCTURE

$z := 0\ ft$ HEIGHT OF ATTACHMENT POINT

$$F_{pnom} := \frac{0.4 \cdot a_p \cdot S_{DS}}{\frac{R_p}{I_p}} \cdot \left(1 + 2 \cdot \frac{z}{h_n}\right) = 0.172$$ EQ. 13.3-1

$$F_{pmax} := 1.6 \cdot S_{DS} \cdot I_p = 1.725$$ EQ. 13.3-2

$$F_{pmin} := 0.3 \cdot S_{DS} \cdot I_p = 0.323$$ EQ. 13.3-3

$$F_p := min\left(F_{pmax}, \max\left(F_{pnom}, F_{pmin}\right)\right) = 0.323$$

DETERMINE THE SEISMIC FORCE APPLIED TO THE EQUIPMENT:

$V_{ECTS} := W_{CTS} \cdot F_p = 168.17\ \mathit{lbf}$ CTS seismic shear

$M_{ECTS} := V_{ECTS} \cdot H_{cgCTS} = 0.63\ \mathit{kip} \cdot \mathit{ft}$ Seismic overturning moment

$V_{ED} := W_D \cdot F_p = 139.71\ \mathit{lbf}$ Disconnect seismic shear

$M_{ED} := V_{ED} \cdot H_{cgD} = 0.52\ \mathit{kip} \cdot \mathit{ft}$ Seismic overturning moment

$V_{EATS} := W_{ATS} \cdot F_p = 161.7\ \mathit{lbf}$ ATS seismic shear

$M_{EATS} := V_{EATS} \cdot H_{cgATS} = 0.61\ \mathit{kip} \cdot \mathit{ft}$ Seismic overturning moment

WIND ANALYSIS:

DETERMINE THE WIND LOAD LOAD ON THE TANK PER ASCE 7-16 CHAPER 26 AND CHAPTER 29.

II	RISK CATEGORY, TABLE 1.5-1
$V := 97$	BASIC WIND SPEED (MPH), SECTION 26.5
D	EXPOSURE CATEGORY, SECTION 26.7
$K_d := 0.9$	WIND DIRECTIONALITY FACTOR, TABLE 26.6-1 (SQUARE TANKS)
$K_{zt} := 1.0$	TOPOGRAPHIC FACTOR, SECTION 26.8.2
K_z	VELOCITY PRESSURE EXPOSURE COEFFICIENT, TABLE 26.10-1
$K_e := 1.0$	GROUND ELEVATION FACTOR, SECTION 26.9
$G := 0.85$	GUST FACTOR, SECTION 26.11
$\alpha := 11.5$	TERRAIN EXPOSURE CONSTANTS, TABLE 26.11-1 (EXPOSURE D)
$z_g := 700$	TERRAIN EXPOSURE CONSTANTS, TABLE 26.11-1 (EXPOSURE D)
q_z	VELOCITY PRESSURE AT HEIGHT z, EQ. 26.10-1

DETERMINE THE MAXIMUM VELOCITY PRESSURE AT THE EQUIPMENT CENTER OF GRAVITY

$z := 3.75$ ft. HEIGHT OF EQUIPMENT

$$K_z := 2.01 \cdot \left(\frac{15}{z_g}\right)^{\frac{2}{\alpha}} = 1.03$$

$q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot K_e \cdot V^2 \cdot psf = 22\ psf$ VELOCITY PRESSURE

DETERMINE THE FORCE COEFFICIENT PER SECTION 29.4.2.1

$H_t := H_{tCTS}$ $D := min\left(L_{CTS}, B_{CTS}, L_D, B_D, L_{ATS}, B_{ATS}\right) = 2.00\ ft$

$\frac{H_t}{D} = 3.75$

$C_f := 1.346$ FIGURE 29.4-1

DETERMINE THE WIND PRESSURE PER SECTION 29.5

$p_C := q_z \cdot G \cdot C_f = 26\ psf$

DETERMINE THE WIND LOAD ON THE EQUIPMENT:

$A_{CTS} := H_{tCTS} \cdot \max\left(L_{CTS}, B_{CTS}\right) = 23\ ft^2$

$F_{windCTS} := p_C \cdot A_{CTS} = 575\ lbf$

$V_{WCTS} := F_{windCTS} = 575\ lbf$ Wind shear

$M_{WCTS} := F_{windCTS} \cdot H_{cgCTS} = 2.16\ kip \cdot ft$ Wind overturning

$A_D := H_{tD} \cdot \max\left(L_D, B_D\right) = 19\ ft^2$

$F_{windD} := p_C \cdot A_D = 479\ lbf$

$V_{WD} := F_{windD} = 479\ lbf$ Wind shear

$M_{WD} := F_{windD} \cdot H_{cgD} = 1.8\ kip \cdot ft$ Wind overturning

$A_{ATS} := H_{tATS} \cdot \max\left(L_{ATS}, B_{ATS}\right) = 24\ ft^2$

$F_{windATS} := p_C \cdot A_{ATS} = 623\ lbf$

$V_{WATS} := F_{windATS} = 623\ lbf$ Wind shear

$M_{WATS} := F_{windATS} \cdot H_{cgATS} = 2.34\ kip \cdot ft$ Wind overturning

WIND LOAD CONTROLS

Project: Generator Foundation

FOUNDATION ANALYSIS:

$P_D := W_{CTS} + W_D + W_{ATS} = 1.45\ kip$ DEAD LOAD

$V_W := V_{WCTS} + V_{WD} + V_{WATS} = 1676.85\ lbf$ WIND SHEAR LOAD

$H_{cg} := H_{cgCTS} = 4\ ft$

$M_V := V_W \cdot H_{cg} = 6288.17\ lbf \cdot ft$ WIND MOMENT

USE A 9'-6"x2'-9"x24" DEEP FOOTING MIN. WITH
#5 AT 12" O.C. E.W. TOP AND BOTTOM

General Footing

Project File: 20177.ec6

DESCRIPTION: Equipment Pad

Code References

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	145.0	pcf
φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00090
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50	ksf
Soil Density	=	110.0	pcf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Footing base depth below soil surface	=	1.50	ft
Allow press. increase per foot of depth	=		ksf
when footing base is below	=		ft

Increases based on footing plan dimension

Allowable pressure increase per foot of depth	=	ksf
when max. length or width is greater than	=	ft

Dimensions

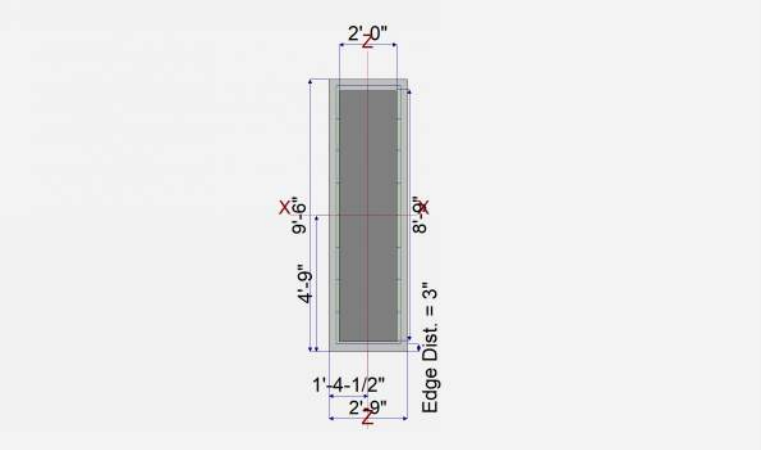
Width parallel to X-X Axis	=	2.750 ft
Length parallel to Z-Z Axis	=	9.50 ft
Footing Thickness	=	24.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	24.0 in
pz : parallel to Z-Z Axis	=	105.0 in
Height	=	0.1250 in

Rebar Centerline to Edge of Concrete...

at Bottom of footing	=	3.0 in



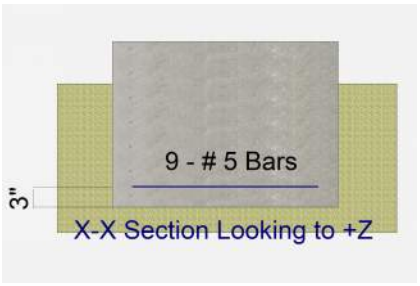
Reinforcing

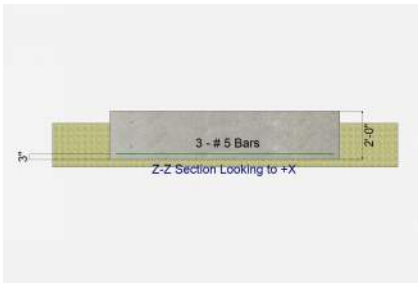
Bars parallel to X-X Axis			
Number of Bars	=		9.0
Reinforcing Bar Size	=	#	5
Bars parallel to Z-Z Axis			
Number of Bars	=		3.0
Reinforcing Bar Size	=	#	5

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

	Bars along X-X Axis
# Bars required within zone	44.9 %
# Bars required on each side of zone	55.1 %





Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	1.452							k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=					6.288			k-ft
V-x	=					1.677			k
V-z	=								k

General Footing

Project File: 20177.ec6

DESCRIPTION: Equipment Pad

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8180	Soil Bearing	1.227 ksf	1.50 ksf	+0.60D-0.60W about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	1.285	Overturning - Z-Z	5.796 k-ft	7.448 k-ft	+0.60D+0.60W
PASS	4.270	Sliding - X-X	1.006 k	4.297 k	+0.60D+0.60W
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.005429	Z Flexure (+X)	0.1486 k-ft/ft	27.373 k-ft/ft	+0.90D+W
PASS	0.005429	Z Flexure (-X)	0.1486 k-ft/ft	27.373 k-ft/ft	+0.90D-W
PASS	0.000174	X Flexure (+Z)	0.005470 k-ft/ft	31.454 k-ft/ft	+1.40D
PASS	0.000174	X Flexure (-Z)	0.005470 k-ft/ft	31.454 k-ft/ft	+1.40D
PASS	n/a	1-way Shear (+X)	0.0 psi	82.158 psi	n/a
PASS	0.0	1-way Shear (-X)	0.0 psi	0.0 psi	n/a
PASS	n/a	1-way Shear (+Z)	0.0 psi	82.158 psi	n/a
PASS	n/a	1-way Shear (-Z)	0.0 psi	82.158 psi	n/a
PASS	n/a	2-way Punching	7.991 psi	82.158 psi	+1.40D

Top reinforcing mat required (see 'Bending' tab).

Hand check required for anchor pullout.

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc (in)	Zecc (in)	Actual Soil Bearing Stress @ Location Bottom, -Z	Top, +Z	Left, -X	Right, +X	Actual / Allow Ratio
X-X, D Only	1.50	n/a	0.0	0.3456	0.3456	n/a	n/a	0.230
X-X, +D+0.60W	1.50	n/a	0.0	0.3456	0.3456	n/a	n/a	0.230
X-X, +D-0.60W	1.50	n/a	0.0	0.3456	0.3456	n/a	n/a	0.230
X-X, +D+0.450W	1.50	n/a	0.0	0.3456	0.3456	n/a	n/a	0.230
X-X, +D-0.450W	1.50	n/a	0.0	0.3456	0.3456	n/a	n/a	0.230
X-X, +0.60D+0.60W	1.50	n/a	0.0	0.2073	0.2073	n/a	n/a	0.138
X-X, +0.60D-0.60W	1.50	n/a	0.0	0.2073	0.2073	n/a	n/a	0.138
X-X, +0.60D	1.50	n/a	0.0	0.2073	0.2073	n/a	n/a	0.138
Z-Z, D Only	1.50	0.0	n/a	n/a	n/a	0.3456	0.3456	0.230
Z-Z, +D+0.60W	1.50	7.703	n/a	n/a	n/a	0.0	0.8589	0.573
Z-Z, +D-0.60W	1.50	-7.703	n/a	n/a	n/a	0.8589	0.0	0.573
Z-Z, +D+0.450W	1.50	5.778	n/a	n/a	n/a	0.0	0.7054	0.470
Z-Z, +D-0.450W	1.50	-5.778	n/a	n/a	n/a	0.7054	0.0	0.470
Z-Z, +0.60D+0.60W	1.50	12.839	n/a	n/a	n/a	0.0	1.227	0.818
Z-Z, +0.60D-0.60W	1.50	-12.839	n/a	n/a	n/a	1.227	0.0	0.818
Z-Z, +0.60D	1.50	0.0	n/a	n/a	n/a	0.2073	0.2073	0.138

ANCHORAGE DESIGN:

LC: (0.9-0.2Sds)D+Ω_0 E

$D2 := B_{CTS} = 2.0\ ft$ Distance between anchors

$n := 4$ Assumed Number of Anchors

$$P := \left(0.9 - 0.2\ S_{DS}\right) \cdot \frac{W_{CTS}}{n} - \frac{\Omega_0 \cdot M_{ECTS}}{D2 \cdot 2} = -226\ lbf$$

Maximum uplift at anchor location

$$V_x := \frac{\Omega_0 \cdot V_{ECTS}}{n} = 84.084\ lbf$$

Maximum shear at anchor location

LC: 0.9D+W

$$P := 0.9 \cdot \frac{W_{CTS}}{n} - \frac{M_{WCTS}}{D2 \cdot 2} = -422\ lbf$$

Maximum uplift at anchor location

$$V_x := \frac{V_{WCTS}}{n} = 143.73\ lbf$$

Maximum shear at anchor location

USE 1/2" DIAMETER ANCHORS
MIN. - (4) TOTAL MIN.

Hilti PROFIS Engineering 3.0.90

www.hilti.com

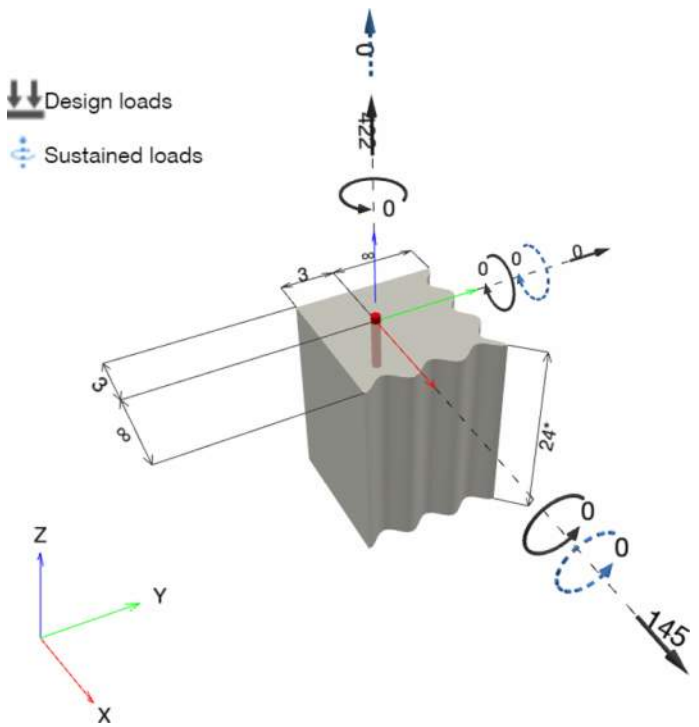
Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

Specifier's comments:

1 Input data

Anchor type and diameter:	**HIT-HY 200 V3 + HAS-E-55 (ASTM F1554 Gr.55) 1/2**
Item number:	2197990 HAS-E-55 1/2"x4-1/2" (element) / 2334276 HIT-HY 200-R V3 (adhesive)
Effective embedment depth:	$h_{ef,opti}$ = 2.750 in. ($h_{ef,limit}$ = 10.000 in.)
Material:	ASTM F1554 Grade 55
Evaluation Service Report:	ESR-4868
Issued I Valid:	11/1/2022 | 11/1/2024
Proof:	Design Method ACI 318-14 / Chem
Stand-off installation:	
Profile:	
Base material:	cracked concrete, 3000, f_c' = 3,000 psi; h = 24.000 in., Temp. short/long: 32/32 °F
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar

Geometry [in.] & Loading [lb, in.lb]



Company:		Page:	2
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 422; V_x = 145; V_y = 0; M_x = 0; M_y = 0; M_z = 0; N_{sus} = 0; $M_{x,sus}$ = 0; $M_{y,sus}$ = 0;	no	32

2 Load case/Resulting anchor forces

Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	422	145	145	0

max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [psi]
resulting tension force in (x/y)=(0.000/0.000): 0 [lb]
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	422	7,984	6	OK
Bond Strength**	422	1,352	32	OK
Sustained Tension Load Bond Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	422	1,890	23	OK

* highest loaded anchor **anchor group (anchors in tension)

Hilti PROFIS Engineering 3.0.90

www.hilti.com

Company:		Page:	3
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

3.1 Steel Strength

N_{sa} = ESR value — refer to ICC-ES ESR-4868

$\phi\ N_{sa} \geq N_{ua}$ — ACI 318-14 Table 17.3.1.1

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.14	75,000

Calculations

N_{sa} [lb]
10,645

Results

N_{sa} [lb]	ϕ_{steel}	$\phi\ N_{sa}$ [lb]	N_{ua} [lb]
10,645	0.750	7,984	422

Company:		Page:	4
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

3.2 Bond Strength

$N_a = \left(\frac{A_{Na}}{A_{Na0}}\right) \psi_{ed,Na} \psi_{cp,Na} N_{ba}$ — ACI 318-14 Eq. (17.4.5.1a)

$\phi N_a \geq N_{ua}$ — ACI 318-14 Table 17.3.1.1

A_{Na} see ACI 318-14, Section 17.4.5.1, Fig. R 17.4.5.1(b)

$A_{Na0} = (2 c_{Na})^2$ — ACI 318-14 Eq. (17.4.5.1c)

$c_{Na} = 10 d_a \sqrt{\frac{\tau_{uncr}}{1100}}$ — ACI 318-14 Eq. (17.4.5.1d)

$\psi_{ed,Na} = 0.7 + 0.3 \left(\frac{c_{a,min}}{c_{Na}}\right) \leq 1.0$ — ACI 318-14 Eq. (17.4.5.4b)

$\psi_{cp,Na} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}}\right) \leq 1.0$ — ACI 318-14 Eq. (17.4.5.5b)

$N_{ba} = \lambda_a \cdot \tau_{k,c} \cdot \pi \cdot d_a \cdot h_{ef}$ — ACI 318-14 Eq. (17.4.5.2)

Variables

$\tau_{k,c,uncr}$ [psi]	d_a [in.]	h_{ef} [in.]	$c_{a,min}$ [in.]	$\alpha_{overhead}$	$\tau_{k,c}$ [psi]
2,261	0.500	2.750	3.000	1.000	1,156

c_{ac} [in.]	λ_a
4.136	1.000

Calculations

c_{Na} [in.]	A_{Na} [in.^{2}]	A_{Na0} [in.^{2}]	$\psi_{ed,Na}$
7.136	102.73	203.68	0.826

$\psi_{cp,Na}$	N_{ba} [lb]
1.000	4,993

Results

N_a [lb]	ϕ_{bond}	ϕN_a [lb]	N_{ua} [lb]
2,081	0.650	1,352	422

Company:		Page:	5
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

3.3 Concrete Breakout Failure

$N_{cb} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ ACI 318-14 Eq. (17.4.2.1a)

$\phi N_{cb} \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Nc} see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-14 Eq. (17.4.2.1c)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.5b)

$\psi_{cp,N} = MAX\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.7b)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ ACI 318-14 Eq. (17.4.2.2a)

Variables

h_{ef} [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
2.750	3.000	1.000	4.136	17	1.000	3,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
50.77	68.06	0.918	1.000	4,246

Results

N_{cb} [lb]	$\phi_{concrete}$	ϕN_{cb} [lb]	N_{ua} [lb]
2,908	0.650	1,890	422

Hilti PROFIS Engineering 3.0.90

www.hilti.com

Company:		Page:	6
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	145	4,150	4	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength (Bond Strength controls)**	145	2,913	5	OK
Concrete edge failure in direction y-**	145	2,311	7	OK

* highest loaded anchor **anchor group (relevant anchors)

4.1 Steel Strength

V_{sa} = ESR value refer to ICC-ES ESR-4868
ϕ $V_{steel} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]
0.14	75,000

Calculations

V_{sa} [lb]
6,385

Results

V_{sa} [lb]	ϕ_{steel}	ϕ V_{sa} [lb]	V_{ua} [lb]
6,385	0.650	4,150	145

Company:		Page:	7
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

4.2 Pryout Strength (Bond Strength controls)

$V_{cp} = k_{cp}\left[\left(\frac{A_{Na}}{A_{Na0}}\right) \psi_{ed,Na} \psi_{cp,Na} N_{ba}\right]$ ACI 318-14 Eq. (17.5.3.1a)

$\phi V_{cp} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Na} see ACI 318-14, Section 17.4.5.1, Fig. R 17.4.5.1(b)

$A_{Na0} = (2 c_{Na})^2$ ACI 318-14 Eq. (17.4.5.1c)

$c_{Na} = 10 d_a \sqrt{\frac{\tau_{uncr}}{1100}}$ ACI 318-14 Eq. (17.4.5.1d)

$\psi_{ed,Na} = 0.7 + 0.3 \left(\frac{c_{a,min}}{c_{Na}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.5.4b)

$\psi_{cp,Na} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{c_{Na}}{c_{ac}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.5.5b)

$N_{ba} = \lambda_a \cdot \tau_{k,c} \cdot \pi \cdot d_a \cdot h_{ef}$ ACI 318-14 Eq. (17.4.5.2)

Variables

k_{cp}	$\alpha_{overhead}$	$\tau_{k,c,uncr}$ [psi]	d_a [in.]	h_{ef} [in.]	$c_{a,min}$ [in.]	$\tau_{k,c}$ [psi]
2	1.000	2,261	0.500	2.750	3.000	1,156

c_{ac} [in.]	λ_a
4.136	1.000

Calculations

c_{Na} [in.]	A_{Na} [in.^{2}]	A_{Na0} [in.^{2}]	$\psi_{ed,Na}$
7.136	102.73	203.68	0.826

$\psi_{cp,Na}$	N_{ba} [lb]
1.000	4,993

Results

V_{cp} [lb]	$\phi_{concrete}$	ϕV_{cp} [lb]	V_{ua} [lb]
4,161	0.700	2,913	145

Company:		Page:	8
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

4.3 Concrete edge failure in direction y-

$V_{cb} = \left(\frac{A_{Vc}}{A_{Vc0}}\right) \psi_{ed,V} \psi_{c,V} \psi_{h,V} \psi_{parallel,V} V_b$ — ACI 318-14 Eq. (17.5.2.1a)

$\phi V_{cb} \geq V_{ua}$ — ACI 318-14 Table 17.3.1.1

A_{Vc} see ACI 318-14, Section 17.5.2.1, Fig. R 17.5.2.1(b)

$A_{Vc0} = 4.5 c_{a1}^2$ — ACI 318-14 Eq. (17.5.2.1c)

$\psi_{ed,V} = 0.7 + 0.3\left(\frac{c_{a2}}{1.5c_{a1}}\right) \leq 1.0$ — ACI 318-14 Eq. (17.5.2.6b)

$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0$ — ACI 318-14 Eq. (17.5.2.8)

$V_b = \left(7\left(\frac{l_e}{d_a}\right)^{0.2}\sqrt{d_a}\right) \lambda_a \sqrt{f'_c}\, c_{a1}^{1.5}$ — ACI 318-14 Eq. (17.5.2.2a)

Variables

c_{a1} [in.]	c_{a2} [in.]	$\psi_{c,V}$	h_a [in.]	l_e [in.]
3.000	3.000	1.000	24.000	2.750

λ_a	d_a [in.]	f'_c [psi]	$\psi_{parallel,V}$
1.000	0.500	3,000	2.000

Calculations

A_{Vc} [in.^{2}]	A_{Vc0} [in.^{2}]	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [lb]
33.75	40.50	1.000	1.000	1,981

Results

V_{cb} [lb]	$\phi_{concrete}$	ϕV_{cb} [lb]	V_{ua} [lb]
3,302	0.700	2,311	145

5 Combined tension and shear loads

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.312	0.063	5/3	16	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

Hilti PROFIS Engineering 3.0.90

www.hilti.com

Company:		Page:	9
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Design Strengths of adhesive anchor systems are influenced by the cleaning method. Refer to the INSTRUCTIONS FOR USE given in the Evaluation Service Report for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/
- Installation of Hilti adhesive anchor systems shall be performed by personnel trained to install Hilti adhesive anchors. Reference ACI 318-14, Section 17.8.1.

Fastening meets the design criteria!

Company:		Page:	10
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

7 Installation data

Anchor type and diameter: HIT-HY 200 V3 + HAS-E-55 (ASTM F1554 Gr.55) 1/2

Profile: -

Item number: 2197990 HAS-E-55 1/2"x4-1/2" (element) / 2334276 HIT-HY 200-R V3 (adhesive)

Hole diameter in the fixture: -

Maximum installation torque: 360 in.lb

Plate thickness (input): -

Hole diameter in the base material: 0.562 in.

Hole depth in the base material: 2.750 in.

Drilling method: Hammer drilled

Minimum thickness of the base material: 4.000 in.

Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

1/2 Hilti HAS Carbon steel threaded rod with Hilti HIT-HY 200 V3 Safe Set System

7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• Compressed air with required accessories to blow from the bottom of the hole • Proper diameter wire brush	• Dispenser including cassette and mixer • Torque wrench

Coordinates Anchor in.

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0.000	0.000	3.000	-	3.000	-

Company:		Page:	11
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	Equipment	Date:	1/4/2024
Fastening point:			

8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

APPENDIX A

GEOTECHNICAL REPORT

#146d

SOILS INVESTIGATION

MAINTENANCE BUILDING ADDITION

PORT OF TACOMA

of

ADAMS HODSDON BESSETTE

TACOMA

W.O. 8950

OCTOBER 1989

Grover C. Way, P.E.

SOILS INVESTIGATION

MAINTENANCE BUILDING ADDITION

PORT OF TACOMA

of

ADAMS HODSDON BESSETTE

TACOMA

W.O. 8950

OCTOBER 1989

Grover C. Way, P.E.

Grover C. Way, P.E.
CONSULTING SOILS ENGINEER

504 SOUTH 17th STREET
TACOMA, WASHINGTON 98402
Area Code (206) 272-8363

October 31, 1989

Adams Hodsdon Bessette
5308 - 12th Street East
Tacoma, Washington 98421

WO 8950

Attention: Mr. Noel R. Adams, P.E.

Subject: Maintenance Building Addition
Port of Tacoma

Gentlemen:

I have completed a soils investigation for the subject project, in accordance with our recent discussions. A brief description of the investigation is presented in this report, together with indicated recommendations.

PROPOSED PROJECT

The project consists of an addition to the east end of the existing Maintenance Building at the Port of Tacoma. The addition is to be approximately 50 by 100 feet, with construction matching the existing building.

INVESTIGATION

Soil conditions in the addition area were explored by making a total of four test borings, essentially at the four corners of the addition. Locations are shown on the Site Plan, Plate 1. The borings were made by Drilling Unlimited, Inc., of Seattle; three were made on October 16, 1989, and one on October 20, 1989. Logs of the borings are included in the Appendix; soil descriptions on these logs are visual field classifications based on the Unified Soil Classification System.

The borings were made using a truck-mounted drilling rig specifically set up for soil sampling, with hollow-stem augers to advance the drill holes. All soil samples were obtained with a two-inch O.D. split-spoon sampler in accordance with ASTM D-1586. Either the Standard Penetration Resistance or the amount of sampler penetration resulting from 50 hammer blows is shown on the logs.

Laboratory testing was limited to running moisture content tests on all samples recovered. These test results are included on the logs. Testing was done in my lab in Tacoma.

Water level observations recorded on the logs were obtained during the drilling operations.

SOIL CONDITIONS

The top 10 to 15 feet is covered by a bank-run sand and gravel. This material is very dense near the ground surface, and decreases in density with increasing depth. The material at the bottom of this layer was probably end-dumped with little or no effort at compaction.

Below the bank-run fill material a sequence of silty fine sands and fine to medium sands was encountered. Some of these soils may be dredged fill materials; in the Port area it is difficult to distinguish between dredged fill and native soils, since the origin in both cases is identical. These materials are generally in a loose condition.

Groundwater level was encountered at depths ranging from 11 to 14 feet. This level would be influenced by tidal variations.

A strong creosote odor was noted in samples from all four borings, as identified on the logs, with the greatest concentration being in Boring 1. The zone of potential contamination appears to be within the normal variation of groundwater level. Soil samples exhibiting such odors were surrendered to the Port of Tacoma.

RECOMMENDATIONS

The existing building is supported on spread footing foundations which have been designed for an allowable soil bearing pressure of 2000 psf. The addition may also be supported on conventional spread footing foundations at frost depth. Footings may be designed for a maximum soil bearing pressure of 3200 psf; settlements at full applied soil pressure will be one inch. Settlements at smaller applied pressures may be assumed linear.

The analysis indicates that soil bearing pressure beneath the existing footings along the east wall may be increased, provided the footings themselves are structurally adequate to sustain the higher load. Increasing the allowable soil bearing pressure to 3200 psf will produce an additional footing settlement of 0.38 inches.

- continued -

RECOMMENDATIONS, continued.

The existing floor slab is to be replaced as a part of the new construction. The new slab may be designed for a modulus of subgrade reaction K = 500 psi/inch. The existing railroad tracks and ties should be removed as a part of the demolition, and any facilities which penetrate the existing slab (such as the sand tank) should be either removed or cut off at least two feet below the bottom of the new slab. Voids resulting from such removal should be carefully backfilled with clean well-graded bank-run sand and gravel compacted to at least 97 percent of maxiumum density, ASTM D-1557.

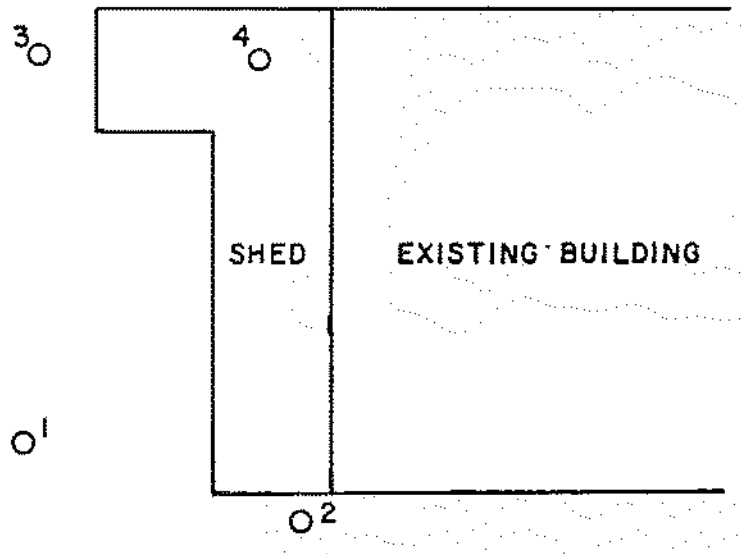
A seismic analysis made for the new addition indicates a possibility of soil liquifaction below a depth of about ten feet for a strong earthquake. This condition also exists for the existing building. It is recommended that no allowable increase in soil bearing pressure be made for seismic loads.

Respectfully submitted,

Grover C. Way, P.E.
Soils Engineer

cc: Port of Tacoma

SCALE: 1" = 40'



O^2 TEST BORING NUMBER AND LOCATION.

Grover C. Way, P.E.
CONSULTING SOILS ENGINEER

MAINTENANCE BUILDING ADDITION

SITE PLAN

W.O. 8950

OCTOBER 1989

1

PLATE

- APPENDIX -

RECORD OF SUBSURFACE EXPLORATION
BORING NO. 1

Sheet 1 of 1

Project PORT OF TACOMA - MAINTENANCE BUILDING ADDITION **Job No.** 8950

Boring Location SEE SITE PLAN

Ground Water Depth 12½ FEET **Date** 10-16-89 **Date Started** 10-16-89

Surface Elevation NOT NOTED **Datum** _____ **Date Completed** 10-16-89

Symbol	Description	Depth	Sample	Blows per Ft.	m.c.		Other
	Grey Gravelly Fine to Medium Sand (SP)		SS-1	35	4.2		
		5	SS-2	14	5.8		
			SS-3	10	--		
	10'	10	SS-4	18	--		
	Grey Fine to Medium Sand (SP)		SS-5	11	--		
	15'	15	SS-6	8	--		
			SS-7	16	24.3		
	Grey Silty Fine Sand (SM)	20					
			SS-8	5	28.4		
		25					
	29'		SS-9	26	29.1		
	Bottom of Boring Strong Creosote Odor Noted, Samples 3 Through 6	30					
		35					
		40					

RECORD OF SUBSURFACE EXPLORATION

BORING NO. 2

Project PORT OF TACOMA - MAINTENANCE BUILDING ADDITION **Job No.** 8950

Boring Location SEE SITE PLAN

Ground Water Depth NOT NOTED **Date** _____ **Date Started** 10-16-89

Surface Elevation NOT NOTED **Datum** _____ **Date Completed** 10-16-89

Symbol	Description	Depth	Sample	Blows per Ft.	m.c.		Other
	Brown to Grey Fine to Coarse Sand & Fine to Coarse Gravel (GW)		SS-1	59	5.6		
		5	SS-2	30	6.7		
			SS-3	50/4"	--		
		10	SS-4	12	--		
	Grey Fine to Medium Sand (SP)		SS-5	10	27.4		
		15	SS-6	14	29.7		
	Grey Silty Fine Sand (SM)		SS-7	7	34.0		
		20	SS-8	10	26.7		
	Grey Silty Fine to Medium Sand (SM)	25	SS-9	15	32.3		
	Bottom of Boring Strong Creosote Odor Noted, Samples 3 & 4	30					
		35					
		40					

10'

15'

25'

29'

RECORD OF SUBSURFACE EXPLORATION

BORING NO. 3

Project PORT OF TACOMA - MAINTENANCE BUILDING ADDITION **Job No.** 8950

Boring Location SEE SITE PLAN

Ground Water Depth 14 FEET **Date** 10-16-89 **Date Started** 10-16-89

Surface Elevation NOT NOTED **Datum** _____ **Date Completed** 10-16-89

Symbol	Description	Depth	Sample	Blows per Ft.	m.c.		Other
	Brown to Grey Fine to Coarse Sand & Fine to Coarse Gravel (GW)		SS-1	72	6.2		
		5	SS-2	38	7.1		
			SS-3	8	11.9		
	10'	10	SS-4	9	21.9		
	Grey Gravelly Fine to Coarse Sand (SW)		SS-5	22	—		
	15'	15	SS-6	23	27.4		
	Grey Fine to Medium Sand (SP) 17'		SS-7	7	32.2		
	Grey Silty Fine Sand (SM)	20					
			SS-8	4	46.7		
		25					
	29'		SS-9	3	39.3		
	Bottom of Boring Strong Creosote Odor Noted, Sample 5	30					
		35					
		40					

RECORD OF SUBSURFACE EXPLORATION

BORING NO. 4

Sheet 1 of 1

Project PORT OF TACOMA - MAINTENANCE BUILDING ADDITION **Job No.** 8950

Boring Location SEE SITE PLAN

Ground Water Depth 11.0 FEET **Date** 10-20-89 **Date Started** 10-20-89

Surface Elevation NOT NOTED **Datum** _____ **Date Completed** 10-20-89

Symbol	Description	Depth	Sample	Blows per Ft.	m.c.		Other
	Brown to Grey Gravelly Fine to Coarse Sand (SW)		SS-1	50/6"	6.4		
		5	SS-2	46	4.0		
			SS-3	7	15.1		
		10	SS-4	6	15.1		
	12'		SS-5	4	--		
	Grey Fine to Medium Sand (SP)	15	SS-6	12	28.9		
			SS-7	5	28.9		
		20					
			SS-8	2	28.8		
	25'	25					
	Grey Silty Fine Sand (SM)		SS-9	5	30.2		
	29'						
	- Bottom of Boring -	30					
	Strong Crosote Odor Noted Sample 5						
		35					
		40					